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ABSTRACT

This volume represents the output of a yearlong effort to clarify and firm the conceptual base that underlies educational RDD&E. It contains three commissioned papers authored by Drs. Hendrik D. Gideonse, Gene V Glass and Blaine R. Worthen, and by Leslie J. Briggs and one paper prepared by H. Del Schalock and G. Roger Sell of the staff of the Oregon Studies. The volume also contains a formal critique of each paper, an author response to each critique, and an introductory and summary critique of the papers as a set. Individually, the papers deal with one or more aspects of the domain of educational RDD&E. Collectively, they deal with the domain as a whole. As a set, the conceptual papers and their critiques are intended to serve as (1) a benchmark document with respect to the conceptual structures underlying educational RDD&E, (2) a primary reference for persons entering the field of educational RDD&E, and (3) a stimulus to the continued dialogue that these papers have only begun. Related documents are EA 004 582-584 and EA 004 586-589. (Author/JH)

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A project entitled, "The Generation of Information to Support Long-Term Manpower Studies of and Planning for Training Programs in Educational R, D, D, & E"

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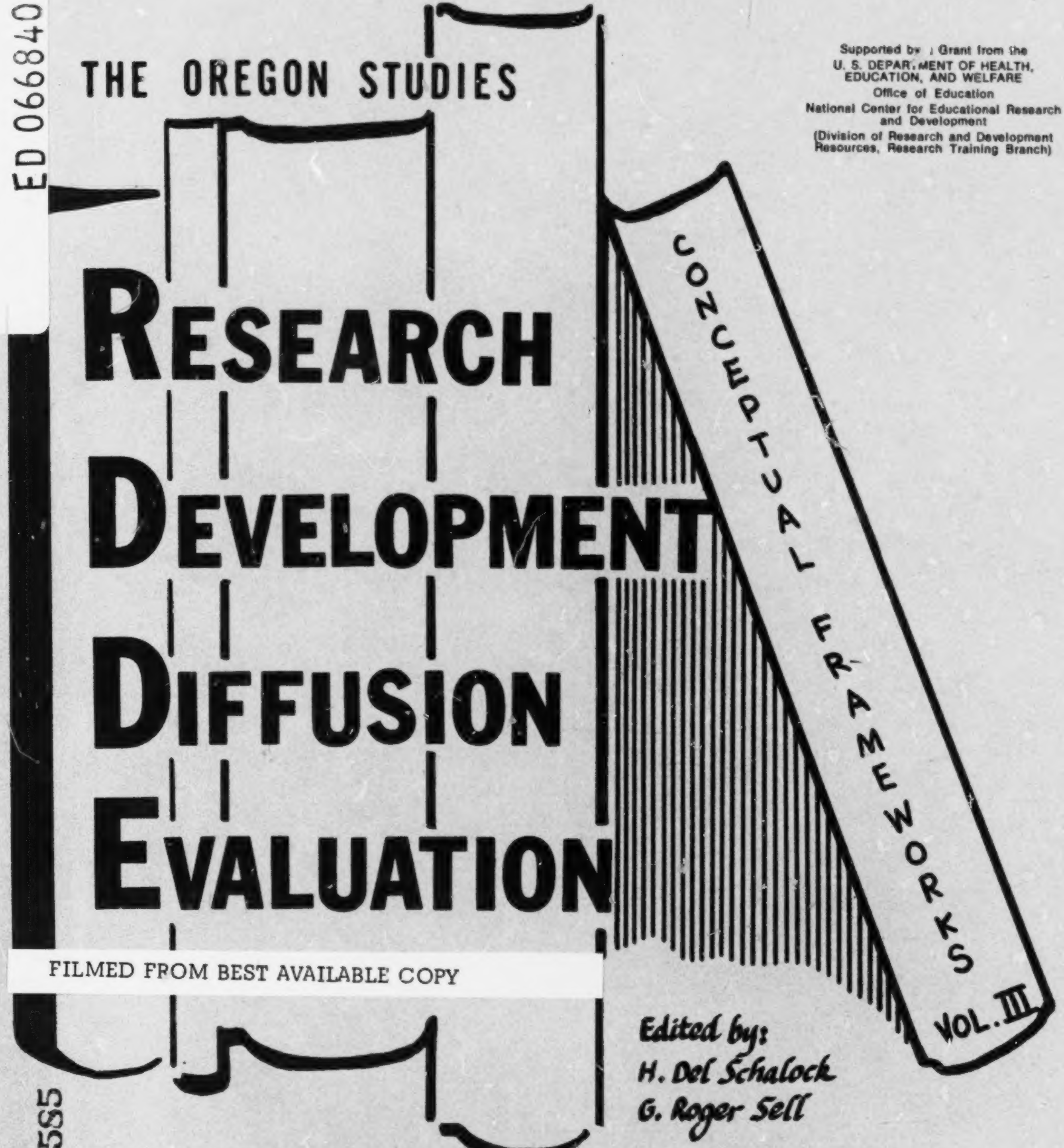

THE OREGON STUDIES

RESEARCH DEVELOPMENT DIFFUSION EVALUATION

CONCEPTUAL FRAMEWORKS

VOL. III

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Edited by:
H. Del Schalock
G. Roger Sell

EA 004 585

TEACHING RESEARCH
a division of the Oregon State System of Higher Education

AN OVERVIEW OF THE OREGON STUDIES IN EDUCATIONAL RDD&E

In the spring of 1970 the Training Branch of the U.S. Office of Education, National Center for Educational Research and Development, announced a plan to effect change in the preparation of educational RDD&E personnel. Two factors led to the announcement. The underlying factor was the rather dramatic emergence in the past decade of development, diffusion, and evaluation activities as vehicles for educational improvement, and the attending need for qualified personnel to carry them out. The precipitating factor, however, was evidence that in spite of an investment of approximately 30 million dollars by the Federal Government to help training programs become more responsive to the personnel needs created by these new activities, essentially the same number and kind of personnel were being prepared in 1970 as in 1965.

The plan for change reflected a strategy that can best be described as "beginning at the beginning." It incorporated three interrelated lines of activity: the creation of a conceptual and empirical base on which to build functional training programs; the design of more effective and efficient approaches to training; and the development of instructional materials that reflect desired changes in both content and procedure. The propositions on which the plan rested were straightforward: (a) little was known about educational development, diffusion and evaluation activities, or how they related to educational research; (b) even less was known about the training of personnel to carry out such activities; and (c) until both of these conditions were remedied the likelihood of designing effective and efficient programs to prepare personnel to carry them out was slight. The plan as a whole was coordinated so that the various activities within it would be developed with sensitivity to each other, and so that they would come together in completed fashion at approximately the same point in time. (For additional details on the plan for change see Chapter I in Volume I of the series reporting the Oregon Studies.)

The Oregon Studies, carried out by the Teaching Research Division of the Oregon State System of Higher Education, were to contribute in a beginning way to the conceptual and empirical base called for in the plan. As such they were to produce five products: a collection of detailed "case study" descriptions of projects that illustrated exemplary RDD&E activities within various educational contexts; a reliable, economically feasible methodology by which to collect the data needed to prepare the case studies; a conceptual system or framework for viewing the domain of educational RDD&E that could be used as a guide to the classes of data to be attended to in the case studies; cross-project analyses that highlighted the similarities and differences observed in the projects described, and that tested in rudimentary fashion the adequacy of the conceptual framework underlying those observations; and a compendium of the existing literature that pertained to either the nature of or the interactions between activities labeled educational research, development, diffusion and evaluation. These products are reported in five volumes:

Volume I.	Summary Report (with Technical Appendices)
Volume II.	The Literature of Educational RDD&E Part One (Research, Evaluation, and Development) Part Two (Diffusion & Combinations of RDD&E)
Volume III.	Conceptual Frameworks for Viewing Educational RDD&E
Volume IV.	Profiles of Exemplary Projects in Educational RDD&E Part One (Research and Evaluation) Part Two (Development) Part Three (Diffusion)
Volume V.	A Methodology for the Study of Educational RDD&E

Each volume in the series reporting the Studies has been designed to stand alone, but because each volume reports a different product, and each product can be understood fully only in relation to the other products, two "reader's guides" to the series have been prepared. The first involves brief summaries or abstracts of the contents of each of the five volumes in the series. These appear on the inside of the back cover of the volume, and are intended to serve as a guide or overview to the series as a whole. A more detailed guide is provided by Volume I. In addition to serving as a general summary of the Studies, it contains descriptions of the developmental histories of the products reported in the various volumes, the relationships that exist between them, and the manner in which they have interacted over time. Accordingly, for the reader who wishes to determine quickly what each of the five volumes in the series contains, turn to the inside of the back cover of the volume; for the reader who wishes to understand how the volumes relate to one another, follow that by reading Volume I.

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Final Report

Project No. 0-0701
Grant No. OEG-0-70-4977

A project entitled, "The Generation of Information to Support Long-Term Manpower Studies of and Planning for Training Programs in Educational R, D, D, & E"

(Volume III of five volumes)

THE OREGON STUDIES IN EDUCATIONAL RESEARCH, DEVELOPMENT, DIFFUSION, AND EVALUATION

VOLUME III

CONCEPTUAL FRAMEWORKS FOR VIEWING EDUCATIONAL RDD&E

Edited by

H. Del Schalock
and
G. Roger Sell

H. Del Schalock, Director of the Oregon Studies

Supported by a Grant from the
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(Division of Research and Development Resources, Research Training Branch)

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ABSTRACT

This is one of five volumes reporting results of the Oregon Studies in Educational Research, Development, Diffusion, and Evaluation (RDD&E). It represents the output of a year-long effort to clarify and firm the conceptual base that underlies educational RDD&E. It contains three commissioned papers, and a paper prepared by the Staff of the Oregon Studies. Drs. Hendrik D. Gideonse, Gene V Glass, Blaine R. Worthen, and Leslie J. Briggs authored the commissioned papers; Dr. H. Del Schalock and Mr. G. Roger Sell authored the Oregon Studies paper. The volume also contains a formal critique of each paper, an author response to each critique, and an introductory and summary critique of the papers as a set. Individually, the papers deal with one or more aspects of the domain of educational RDD&E. Collectively, they deal with the domain as a whole. With regard to area of emphasis, two papers cross-cut the domain, one focuses upon research and evaluation, and another upon development and diffusion. With regard to conceptual orientation, three papers are future-directed (prescriptive), and the one is present-directed (descriptive). With regard to functions examined, one deals with policy, two deal with operations, and one with management and operations. As a set, the conceptual papers and their critiques are intended to: (a) serve as a benchmark document with respect to the conceptual structures underlying educational RDD&E; (b) serve as a primary reference for persons entering the field of educational RDD&E; and (c) serve as a stimulus to the continued dialogue that the papers in the volume have only begun.

PREFACE

The present volume represents the results of a year-long effort to clarify and firm the conceptual base that underlies educational research, development, diffusion, and evaluation (educational RDD&E). It contains three commissioned papers and a paper prepared by the Staff of the Oregon Studies, each of which was to provide an alternative view as to the nature and function of RDD&E within the context of education. It also contains a formal critique of each paper, an author response to each critique, and an introductory and summary critique of the papers as a set. Individually, the papers deal with one or more aspects of the domain of educational RDD&E. Collectively, they deal with the domain as a whole.

Two purposes guided the preparation of the volume: (a) it was to provide the conceptual base for the empirical-methodological thrust within the Oregon Studies, and (b) it was to serve a benchmark function with respect to the conceptual structure underlying the application of RDD&E to the problems of education. In the role of conceptual guide to the Oregon Studies, the three commissioned papers served essentially as input to and context for the development by Staff members of the conceptual framework that served the actual guidon function in the Studies. That framework appears as the fourth paper in the volume.

In the role of a benchmark document, all four papers, and their critiques, play a critical part. By order of appearance in the volume, the first paper provides a review of and an alternative to the basic assumptions that have governed the practice of educational RDD&E, the second and third papers provide reviews of and alternatives to the concepts that have been used to describe the nature and function of educational RDD&E, and the fourth paper provides a set of concepts that have been developed for and tested in the empirical investigation of educational RDD&E. Within this context, it was intended that each of the papers would serve a benchmark function in relation to the particular role it played within the volume, and that the papers as a set would serve a benchmark function for educational RDD&E as an emerging discipline. The criteria and procedures followed in the preparation of the volume are described in the NOTES ON THE DEVELOPMENT OF THE CONCEPTUAL PAPERS that follows immediately after the Table of Contents.

The volume was designed to be used by a relatively wide variety of readers. The fact that it was to provide the conceptual underpinnings to the Oregon Studies, and that it was to serve a benchmark function with respect to the conceptual structure of a discipline, required that it be written for consumption by advanced level professionals. The fact, however, that the conceptual structure of a discipline is the stuff that gives a discipline meaning, and the corresponding fact that anyone planning to enter a discipline must internalize its conceptual structure in order to function professionally within it, suggested that the volume should also be written for consumption by students, the trainers of students, and any who have recently entered the field. Accordingly, the volume has been cast in the framework of a search for sets of conceptual structures that have greater utility than those presently available, and an effort has been made to provide the sources of help and interpretation that a relatively uninitiated reader might need to join meaningfully in that search. By providing such an orientation, by providing critiques of the papers that reflect the differences in point of view that exist in the field, and by providing introductory and summary critiques to the volume as a whole, it is hoped that readers of widely differing backgrounds will be able not only to make their way through the volume, but will be inclined when having done so to view the process of continued conceptual clarification as one of the most critical of all tasks to be engaged in as a professional.

Upon completing the volume some readers may be disappointed in that it does not resolve all the conceptual issues that pervade the field, or that it does not deal in greater detail with the actual operations of educational RDD&E, or that it does not provide clear policy and management guidelines relative to the funding of such activities. Others would have been disappointed had the volume attempted to bring closure to such matters. Whatever one's preferences might be, the intent of the volume was to strike a middle ground: provide as much synthesis as possible, but treat that synthesis as only one of an endless series of syntheses that must occur if the discipline of educational RDD&E is to make a significant difference in the practice of education. Put in another way, the intent of the volume was to bring about as much agreement as possible as to the nature and function of educational RDD&E, highlight the issues that remain, and provide those who wish to tussle with them a good conceptual leg on which to stand. The worth of the volume should be judged in relation to that intent.

As anyone who has had experience in the preparation of a volume of this kind knows, its completion requires the work and cooperation of a great many people. First and foremost, it requires the willingness of highly independent souls to work together on a variety of writing tasks. The manner in which the time and effort of so many were articulated in this regard, the manner in which writing schedules were met--in spite of severe illness and hospitalization in the case of a writer and critiquer--and the manner in which other periodic demands of the editors were accommodated, were little short of miraculous. My sincerest appreciation to those whose names appear on the page which follows.

Appreciation is extended also to Drs. Harry Ammerman, Norman Boyan, John Hopkins, Sam Sieber, and James Watson, continuing consultants to the Oregon Studies, for their contributions to the substance and design of the volume; to Drs. Cora Beebe, John Egermeier and Paul Messier of the U.S. Office of Education for their unfailing support of and contributions to the Studies as a whole; to Dr. James H. Beaird, continuing contributor to the volume and Director of Teaching Research, host institution for the Oregon Studies; to Mrs. Bernett Samples, Mrs. Irene Zimmerman, and the late Mrs. Jeri Jenkins as project typists and secretaries; and to Mr. Darrell Clukey and Mr. Norman Crowhurst as copy editors. Without the contributions of these persons the volume would have taken much different form.

Finally, I would like to express my appreciation to my colleague, Roger Sell. Mr. Sell served not only as a co-author in the preparation of one of the papers that appears in the volume, but as general coordinator for the preparation of the volume as a whole. He served in that capacity from the inception of the volume to its printing, and in so doing brought to it a character that reflects his own. Without the likes of a Roger, volumes of this kind would not find their way into print so frequently.

H. Del Schalock
Director of the Oregon Studies

CONTRIBUTORS

WRITERS

Leslie J. Briggs

Hendrik D. Gideonse

Gene V Glass

H. Del Schalock

G. Roger Sell

Blaine R. Worthen

CRITIQUERS

Norman J. Boyan

Francis S. Chase

David L. Clark

J. Thomas Hastings

Glen Heathers

Paul D. Hood

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NOTES ON THE DEVELOPMENT OF THE CONCEPTUAL PAPERS

Five specifications guided the development of the conceptual papers:

1. Each was to define, differentiate, and relate educational RDD&E activities, and provide a rationale for the particular point of view taken in doing so;
2. In combination, the papers were to provide a set of alternative views as to the nature and function of RDD&E activities within the context of education;
3. In combination, the papers were to be inclusive of the various segments of and points of view within the domain of educational RDD&E;
4. In combination, the papers were to provide a synthesis and an extension of earlier conceptual efforts; and
5. At least one of the papers was to be data dependent, that is, it was to be fashioned against and consistent in final form with the framework that guided the empirical thrust of the Oregon Studies.[1]

To meet these specifications, authors were sought who were both well recognized and respected for their contributions to the field, and holders of differing points of view as to the nature of and interdependencies between the elements within it. In addition, the papers were prepared in such a way as to assure that they would meet the criteria against which they were to be developed.

Dr. Hendrik D. Gideonse, for six years Director of the Division of Planning for the U.S. Office of Education's National Center for Research and Development, and now a professional staff member of the Subcommittee on

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[1] The initial plan for the conceptual papers called for their synthesis into what was termed a "preferred" framework. That framework was then to serve as the conceptual base to the empirical and methodological efforts within the Oregon Studies. The assumption underlying the plan was not only that a synthesis could be achieved, but that it should be--both for the benefit of the Oregon Studies and the field as a whole. When the first drafts of the papers were reviewed, however, it was apparent that the notion of synthesis would have to be abandoned. The views presented in the papers were so diverse, and were held with such conviction, that the probability of reaching consensus on a single framework--especially in time for it to be of value to other aspects of the Studies--was near zero. As a consequence, it was decided that only the paper to be prepared by the Oregon Studies staff was to be data dependent, and the writers of the other papers were to be free to develop their respective ideas without regard to the criterion of data dependency or the desire for synthesis.

Executive Reorganization and Government Research, United States Senate, and Adjunct Professor of Policy Science at State University of New York at Buffalo, prepared the paper that appears first in the volume. His long experience in the management of RDD&E activities at the federal level, his interest and participation in policy decisions affecting such activities, and his work as an historian of the field, qualifies him uniquely to address the topic from the point of view of an "informed bureaucrat." From that frame of reference Dr. Gideonse is of the opinion that the conception of research and development traditionally held within education is counterproductive, and he makes that opinion known in his paper, "Research and Development for Education: A Market Model." Reflecting as it does a questioning of the basic assumptions that have governed the practice of educational RDD&E, his paper provides a good point of departure for thinking generally about the role of RDD&E activities within the context of education.

The second and third papers in the volume deal more directly with the practice of and interrelationships between educational RDD&E. The second paper, "Educational Inquiry and the Practice of Education," authored by Drs. Gene V Glass and Blaine R. Worthen of the Laboratory for Educational Research, University of Colorado, focuses heavily upon the nature of educational research and evaluation, and their relationships to the improvement of education. Both Dr. Glass and Dr. Worthen are well known for their concern about these matters, and for their active role in the work of the American Educational Research Association. It is not accidental, therefore, that their paper reflects the "classic" or "AERA" position with respect to the nature and function of RDD&E activities within the context of education.

Dr. Leslie J. Briggs, Professor of Education at Florida State University, and long recognized for his pioneering work in educational systems development, is author of the third paper, "Development and Diffusion as Mechanisms for Educational Improvement." In his paper, Professor Briggs addresses the dual problems of developing demonstrably effective educational practices, and getting those practices into wide use in the schools. After reviewing the literature that pertains to these issues, he outlines a research-based model of development that he believes incorporates within it the elements needed to assure both sound development and widespread diffusion. While there is some overlap of effort between the Briggs and Glass-Worthen papers, it is not so great as to appear redundant.[2]

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[2] Only three papers were commissioned initially for inclusion in the volume. Upon the first review of those papers, however, it was the consensus of all writers and reviewers that a paper should be added that dealt expressly with the concepts of educational development and diffusion. Dr. Briggs, who was serving as a reviewer of the papers at the time, accepted the invitation to prepare such a paper.

The paper prepared by Dr. Schalock and Mr. Sell of the Oregon Studies staff differs from the other papers in that it sets the stage for and provides the concepts used in the empirical thrust of the Oregon Studies. As such, it provides basic definitions of the concepts of educational RDD&E, differentiates rather carefully between them, and spells out their interdependencies in largely operational terms. It provides a review of the existing literature as a basis for the definitions offered, and provides a rationale for thinking of RDD&E activities as "problem-solving tools" within the context of education. In contrast to the other papers, it does not deal with what "ought" to be with respect to the role of such activities in education, or make recommendations as to policy with respect to the long-term support and/or implementation of such activities. The title of the Schalock-Sell paper, "A Framework for the Analysis and Empirical Investigation of Educational RDD&E," accurately reflects its contents.

In addition to the careful selection of authors as a means of assuring quality in the volume as a whole, and differences represented in point of view, each paper was submitted to a formal critique by an independent reviewer. Also, the papers as a set were submitted to formal critiques by two independent reviewers. Dr. David L. Clark, Dean of the School of Education, Indiana University, prepared the critique of the Gideonse paper; Dr. Paul D. Hood, Director of the Communications Program, Far West Laboratory for Educational Research and Development, prepared the critique of the Glass-Worthen paper; Dr. Norman J. Boyan, Dean of the Graduate School of Education, University of California, Santa Barbara, prepared the critique of the Briggs paper; and Dr. Glen Heathers, Professor of Education, Learning Research and Development Center, University of Pittsburgh, prepared the critique of the Schalock-Sell paper. Dr. J. Thomas Hastings, Director of the Center for Instructional Research and Curriculum Evaluation, University of Illinois, and Dr. Francis S. Chase, Educational Consultant, Professor (and Dean) Emeritus, The University of Chicago, prepared, respectively, the introductory and summary critiques of the papers as a set. By providing for such critiques, and an opportunity for authors to respond to them, it was hoped that the strengths and weaknesses of the papers--individually and collectively--would be explicated. It was also hoped that it would open a dialogue at the conceptual level that would continue, for without such interchange there is little hope that educational RDD&E will ever achieve the vitality and sophistication that it must if it is to make an observable difference in the practice of education.

Finally, the procedure followed in the preparation of each of the papers in the volume, and to some extent their critiques, was also designed to further their quality and sensitivity to differing points of view. The first step in the process was to submit draft copies of the three base papers to public review (a two-day conference held on July 26 and 27, 1970), some three months after the papers had been commissioned. With one exception all of the critiquers of the papers, the four continuing consultants to the Oregon Studies,[3] U.S. Office of Education representatives,[4] and selected staff from the Studies took part in the review. Copies of the papers were made available to participants prior to the conference. The critiquer assigned a particular paper led the review of that paper at the conference.

A second conference was held in mid-October, at which time a second draft of the initially commissioned papers, and a first draft of the Briggs paper, were reviewed. As in the first conference, the standing consultants to the project, U.S. Office of Education representatives, and selected staff members from the Oregon Studies took part in the review. In place of the critiquers, however, were the directors of 12 USOE funded projects to design new training programs for the preparation of RDD&E personnel. (For a discussion of the relationship between the training design projects and the Oregon Studies, see Chapter 1 in Volume I of the series reporting the Oregon Studies.) The rationale for the substitution was that input to the papers at that point in time by persons who had been thinking about similar issues, but within an applied context, would be of greater benefit than a second round of review by persons who were to have an opportunity to formally critique the papers at a later time. Copies of the papers presented at the conference were sent to the critiquers.

The July and October conferences constituted the only formally planned sources of input to the preparation of the papers and critiques. Authors used other sources, of course, but what those were, and when and how they were used, was a matter of their own choosing. No formal mechanism was established to provide for face-to-face interaction between critiquers and writers, or between critiquers and critiquers, beyond the July conference. Also, no formal provision was made for the interaction of the authors of the papers with the critiquers or with the editors of the volume beyond the July and October conferences. As a consequence, the form and substance of both the papers and critiques are very much a matter of the author's own style, point of view, and interpretation of role.

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[3] The continuing consultants to the Studies were Dr. Harry L. Ammerman, an industrial psychologist with the Human Resources Research Organization; Dr. Samuel D. Sieber, a social psychologist at the Bureau of Applied Social Research, Columbia University; and Dr. James Watson, a social anthropologist at the University of Washington. Dr. John E. Hopkins of Indiana University, while technically a consultant to the U.S. Office of Education, also functioned as a continuing consultant to the project throughout its history. Following the October conference, Dr. Ammerman joined the project staff.

[4] The U.S. Office of Education representatives attending the two conferences were Drs. Cora Beebe, from the Planning and Evaluation Division, John Egermeier, head of the Research Training Branch, and Paul Messier, at that time Director of the Division of Higher Education within the National Center for Research and Development. Dr. Messier is now directing implementation planning for the proposed National Foundation for Higher Education.

A READER'S INTRODUCTION TO FOUR CONCEPTUAL PAPERS ON EDUCATIONAL RDD&E

CRITIQUER: J. Thomas Hastings
Director, Center for Instructional
Research and Curriculum Evaluation
University of Illinois at Urbana-Champaign

A READER'S INTRODUCTION TO FOUR CONCEPTUAL PAPERS ON EDUCATIONAL RDD&E

J. Thomas Hastings

Center for Instructional Research
and Curriculum Evaluation (CIRCE)

University of Illinois at Urbana-Champaign

Introduction

You have located the proper document if you are one of those concerned with slowness (or lack!) of change in our schooling efforts. Also, if you are among those who are dismayed at the apparent lack of influence of basic research--or even applied research--on the development of new materials, approaches, or goals for our educational enterprise, you should give more than cursory examination to parts of all four position papers which form the body of this collection. Perhaps you are among those who believe that too many "things" get foisted into schooling (in which case that is your color-word, not mine) without sufficient information about worth from evaluation studies. Then read and learn--or read and wax polemic! Finally, if your "respected others" include those who bewail that all of those well-tested and research-based developments never seem to get adopted by many schools (and the chances are that they are development people!), then read sections of at least two of the papers which emphasize possible solutions to the dissemination problem. In short, if you are concerned with any aspects of research, development, dissemination, and evaluation--in any order--in education, you are obligated to peruse the four papers and set about constructing better positions. On the other hand, if you feel that you have no concern with RDD&E--but are involved in education today--you owe yourself an awakening.

Not that these papers are the only--and certainly not the last--word on such subjects. They are, however, carefully written and documented arguments (and, for the most part, their assumptions are showing) for improving the quality of education through planning the interrelationships and strategies of that segment called RDD&E. Other aspects of the total educational undertaking could have been the focus. They should be elsewhere. For examples, try increasing (or decreasing) teachers' salaries or certification--or focus on altering the quantity and quality of local community participation--or wrestle with the problems of combining the pedagogical and nonpedagogical disciplines with each other and with our great social-political thinkers to solve our educational dissatisfactions. Each of these is worthy of thought, and some creep faintly into these papers. It remains that RDD&E constitute an important portion of the system in need of study.

The Range of Plans and Strategies

For convenience in alluding to the separate documents, I shall hereafter refer to them by the last names of the authors.

The first paper, by Gideonse, comes very near to standing the old linear model of R, D, D, and E--done in that order--on its head. Or, perhaps it transplants the head to the current foot-end. Without ignoring "R" and "E," Gideonse leaves me with the impression that the two "D" members of the quadrivial system are definitely to be rewired.

Glass and Worthen concentrate on the meanings, the strategies, and the expectations for educational inquiry and related activities. Their emphasis is heavily upon the "R" and the "E," albeit they do not ignore some of the knowledge about and arguments concerning both "D's."

Briggs treats the two "D's" as a central concern, even though he demonstrates his awareness that a new configuration in these areas will have to be taken into consideration by both "R" and "E" arrangements and goals.

The final paper, by Schalock and Sell, concentrates with passion (and with rationale) on the need for further empirical study of alignment of all four elements somewhat as they are beginning to exist. At the same time they point out the requirement for continuing support of both "traditional" research and a newer enabling research on RDD&E functions, activities, and relations.

The document as a whole contains such varied concerns as arrangements for a finer grid of regional effort (Gideonse) and the need for a new reward system for evaluation within the research community (Glass-Worthen). There are suggestions for moving all of dissemination, and perhaps quantities of development, to the private sector and leaving inquiry to the universities and related structures (Glass-Worthen). These strategies are played against plans for having the major non-private effort in consumer needs and thereby dissemination (Gideonse) and (Briggs). In some places the document deals heavily with the training and nurture of special school personnel (Gideonse), while in other pages the training of R & E personnel is stressed as an important requirement (Glass-Worthen). A number of different schema or diagrams work heuristically to send one in different directions. Discussions of supporting personnel-needs (Schalock-Sell) and accounts of different modes of funding both appear (Glass-Worthen), along with presentations of examples of innovation- or change-systems (Briggs) as well as schema for analysis of operations at different levels (Schalock-Sell). Happily, however, the range of topics and ideas has been limited to things which do bear discernibly on educational RDD&E. The authors do not, in my estimation, waste time on telling of their pet projects. Although there is some overlap in bibliography, the total range of documents cited is grand to behold.

This diversity of topics (and viewpoints) makes the total effort much more heuristic than didactic, although some sections within each paper take the latter mode indeed. Perhaps someone should be commissioned to cut-and-paste (or to index) the document to arrange a "handbook" of ideas and plans for the system. If they do, I shall look at the product. But I prefer to give the worth-points for the volume's present organization--compelling one to listen to arguments for different approaches through papers reasonably consistent within themselves.

Similarities--Dissimilarities

Other reviewers have been requested to look at and critique each document. My task, as I understand it, is to critique (I prefer "comment on") the assemblage of the papers. However, I must compare and contrast within to get the flavor of the whole. If one were critiquing a paper by a single author, he would look for consistency-inconsistency. I find myself looking for the analogue across four sets of authors. But the word should never be consistency nor its antipode. Obviously, style is a dimension which attracts attention. Perhaps Glass-Worthen is the most informal style, with Schalock-Sell being, not its opposite (none is), but further down the line toward staunchly structured. This figures. Schalock-Sell deals with an empirical attack on "what now lives" and "what may live." You had better be carefully structured and formal for that task. Schalock-Sell contains more categorical listings, taxonomic outlines, and "steps-to-be-taken" than the others. Gideonse and Briggs are structured and formal in a different sense. Each is consciously building the model--although neither carries that aura of "having found it" that many PPBS writers seem to have. None engages in turgid prose, although some readers who dislike carefully protected statements may think each does at times. The four are more similar than different in style (and now I have made enemies of each!).

A strong similarity across the papers is the extent to which each piles definition upon definition. As should be expected from the subject-matter, they tend to be defining the same terms. Furthermore, when they do define the same terms, there is a marvelous agreement for the most part. Exceptions to this include the definitions of evaluation by Glass-Worthen and by Gideonse. The latter tends to equate the two, especially if Stufflebeam's CIPP is the evaluation model. Glass-Worthen looks more often at the dissimilarity between research and evaluation. They do this with the rationale that most people see the similarities, but that now is a time that pointing out the differences may help support evaluation as a separate area. The Briggs definition of evaluation is less explicit than the others. He was, after all, dealing more narrowly with development and dissemination. Schalock-Sell, as I read it, could agree with both Glass-Worthen and Gideonse. This bothers me, but then their model calls for a study of what is. I strongly suspect that "what is" agrees with both--and many others.

The differentiation of basic and applied research is another area of high similarity, if not total agreement. But then each uses some form of the definition supplied by NSF a few years ago. None of them seemed to say that all of educational research is applied, which is an attestation heard in significant quarters. I was a bit surprised by Glass-Worthen on that count, since I thought that Glass said educational research is applied in his 1968 Research Paper No. 22 (see Glass-Worthen bibliography).

The four papers are similar in that they all see a need to get new things into the schools, and they feel that we are doing this less efficiently now than is possible. Also, from these papers I get the feeling that each would depend on some form of RDD&E (different fixes, different mixes) to do this.

All four papers see the need to look to other domains for suggestions as to what works, e.g., to military, to hard sciences, to industry. Glass-Worthen is lightest on this push; Briggs is by far the heaviest; Gideonse and Schalock-Sell follow Glass-Worthen in that order. All recognize that the educational context is a social-political one, but first Gideonse and second Briggs make more ado about it. No paper suggests that education can copy the most successful model from other domains: agriculture, military, industry. And they seem to agree for the most part on the reasons.

Briggs and Gideonse are strongest in appearing to make the assumption that if personnel from many educational areas are brought together to discuss aims and need there will emerge agreement. Briggs claims it. Gideonse seems to assume it. Glass-Worthen and Schalock-Sell are less explicit, but I get the feeling that they believe aims and methods of instruction-learning are better left in the hands of experts. Here we have two author sets in agreement when we contrast explicit statements of the other two sets--not because it was a debated issue among the four sets of the six authors.

Another dimension along which we have similarities or dissimilarities is that of time of application of the "model." From where I sit, Glass-Worthen could start yesterday whereas Gideonse is definitely a future-oriented model. He states, "Models can either describe present conditions or they can describe ideal states as possible future conditions. Both kinds of modeling are useful, but it is important to be clear which is being attempted. In the case of this paper, the model is future oriented to a state of affairs conceived to be desirable." (Gideonse, p.14 of manuscript) On this dimension, Briggs can start forming a new consortium in any one or more locations, of different sizes, with somewhat different mixes as of tomorrow. The main thing which must be present is a mix which includes persons from each domain: teachers, administrators, community, developers, and researchers. Evaluators seem to be included in the last named class. The Schalock-Sell model has begun. They have been doing empirical studies of RDD&E activities, organization, operations, outputs, and inputs.

In general, the similarities of the four papers outweigh the dissimilarities two-to-one. This is comforting. It either results from a cult--or a party line--or it results from bright minds coming to agreement on a complicated problem. I am biased by knowing the people. But the evidence says that they arrived at these similarities (in the words I used before) "by carefully written and documented arguments." But then, I am connected with a university; but then, I have engaged in a moderate way in several of the four aspects under consideration; but then, I am one person reading the four position papers. I am willing to critique, but you read also!

Conflicts

It is possible to have similarities with conflicts. It is possible to have dissimilarities without or with conflicts. For example: Ford Motor Car has similarities with Pontiac Motor Car. Their LTD and Bonneville, particularly, have much in common. But there are conflicts. A buyer cannot believe equally in each--unless he is a coin-flipper! Can a "buyer" of RDD&E believe equally in each of the four papers? Perhaps the better question is, "To what extent can a 'buyer' believe equally in the plans set by each paper?"

As implied earlier, the four papers tend to treat different aspects of the educational-change problem related to RDD&E. It is difficult to obtain real conflict if one group is trying to improve the parks and another is wanting to improve the traffic flow. . .except in the funding area. Noninfinite resources call for conflict in implementation among different proposals for action. The Congress would see conflicts in the position papers.

One obvious conflict between Glass-Worthen and Gideonse is in connection with the question of who initiates improvement. Quotes will show it better than I could describe it. First Glass-Worthen: "For some time to come, education is more likely to be improved through ingenious invention inspired by basic research and hard-headed evaluation of the inventions than by the direct application of the fruits of basic educational inquiry" (manuscript, p.101). Then Gideonse: "Successful innovations derived through research and development are more likely to arise from careful consideration of market requirements or possibilities than from the theoretical or technical possibilities emergent from R&D by itself" (manuscript, p. 21). Maybe they are not so far apart if the researchers are watching what is wanted (needed) in the schools. But as things stand in the original papers, concerned persons outside the establishment (the Congress, groups of taxpayers, involved parents) would see a difference.

Another conflict arises when Schalock-Sell says to study the system empirically and try to improve it--and Briggs says forget it. Briggs wants to start a new system which has the school at the initiation point. My view is that the Congress should fund each on a small-scale try-out. But that is something which the Office of Education has never been able to do. For every situation, they take the approach of doing a monolithic job of including the total population. Politically, all states, territories, and ethnic groups must be included. Therefore, one cannot try out two or more models at the same time.[1] In my view of our present position, we need to limit our samples to much smaller regions or types and take multiple approaches. I am fully aware of the political necessity of giving "new" things to every region. I say that if a certain state, say X, does not seem to have much of a proposal, close your eyes and fund them anyway.

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[1] Exceptions to this may be Follow-Through and Triple-T. Both had some welcomed variation in treatment, but even in this case, there was expected generalizability of outcomes. No way! The variables involved were never equivalent.

One possible final conflict among the papers in this document concerns the use of the private sector as opposed to Federal and State support. Glass-Worthen, as stated previously, would turn most development and dissemination to private industry and business. Gideonse would bring them into a very narrow range of activities. Briggs and Schalock-Sell are less explicit in the use of the private sector, but I feel that each would use it if the money were there.

Disappointments

I looked at some length for one of the sets of authors to take a different view than that which says, "Data (information) about programs and their outcomes make a difference in decision-making at the upper levels." No one of them took the position that top-echelon people (Federal, State, or local) make decisions on the basis of the question, "What will get me the furthest--or get my unit the most power?" I can not help but think--from experience--that most policy bodies or individuals pay little attention to data unless the data fit their views. Those of us in RDD&E do believe in looking at the data. Most of those in bureaucracies are looking for more power--more control. This is not necessarily denegrative, though it may be anti-quality-improvement in some cases. However, I find no reference to this behavior in the four papers. Surely they know of the existence of such behavior! Especially should this be true of Gideonse. He does refer to politics, but not in these terms.

I was disappointed also in the lack of attention to the politics of the local school system. This complaint is related to the foregoing one--but there are differences. Why should a given superintendent enter into a combine of schools and research centers with a real desire to innovate? Innovations, by definition, are risks. If the new trick succeeds (and he is in a cooperative with other districts), he does no better than they do. His board says, "forget it." If it fails, he is in the same sinking boat with the others. That is no help with the local taxpayers. Each top administrator needs to enter into agreements for innovations for which he takes the risk and, in most school situations, he feels that he should not take many risks.

In most large school districts, the administrative support staff (supervisors, directors of curriculum, principals--for instance) are locked into a system which by its very nature opposes the initiation of change by individuals. In part, because of this, the teaching staff are conditioned against making (or having much to do with) policy matters. If a teacher really wants to do something very different, he is better off doing it quietly. In Briggs we get some excellent plans for forming consortia which will include RD&E people along with administrators, teachers, and community persons. But I was a trifle disappointed that there seemed to be insufficient discussion of the immense problems that can be created by that mix. Education has witnessed some of the problems in the last few years in connection with Head Start and Follow-Through programs, among others.

Finally, and briefly, I felt that there was far too little reference to the plurality of American education: different souls have different goals. The tone of Schalock-Sell, to my ear, was one of "a great thing is developed, so all will use." Mind you, they do not say that. Glass-Worthen makes no reference to the mix of values in any one school community or on the national scene. Briggs actually suggests that one will get great consensus on aims and needs within the smaller consortia, although room is left for differing goals across them. Gideonse's market model comes very close to providing for plurality, but it does not explicitly deal with the problem and its consequences, at least as I read it. For example, can a school system administrator afford to take a very strong stand on a single set of objectives or needs in a community which includes a vocal mix of priorities? Isn't he better off forming consensus of the vague generalities of "quality education" or "improved citizenship" and the like, all of which are less than fully useful to the developers?

The Worth

My opening paragraphs do express my notion of the worth of the whole document. I am very glad that the large task was not assigned to one author or even a consensus-finding group of them. Professionals and lay policymakers should read all four position papers. They do contain a storehouse of ideas worth debating, trying, and knocking against each other. None of them is written with the pedantry of the panacea-giver. You too, I hope, will have some disappointments. And I trust that at least some of you will have different ones from mine and from each other. But I predict that most readers will have an overall reaction that says they found something well worth reading.

CHAPTER 1

RESEARCH AND DEVELOPMENT FOR EDUCATION: A MARKET MODEL

AUTHOR: Hendrik D. Gideonse
Professional Staff Member
U.S. Senate Subcommittee on Executive
Reorganization and Government Research, and
Adjunct Professor of Policy Science, State
University of New York at Buffalo

CRITIQUER: David L. Clark
Dean, School of Education
Indiana University

SYNOPSIS

The Gideonse paper provides a review of and an alternative to the basic assumption that have governed educational RDD&E. It is argued in the paper that RDD&E activities are context specific, and that when applied within the context of education they assume different forms and roles than they do, for example, within the contexts of medicine, agriculture, or industry. It is also argued that, when applied to education, RDD&E are as much social-political activities (because they always involve tne matter of values) as they are scientific, and because of that, the decision structures within them must incorporate persons at the receiving as well as the delivering end. In Gideonse's terms such a view of educational RDD&E requires "...turn(ing on its) head (the) basically linear and hierarchical notions about how research and development can improve educational practice... (and turn instead to) a highly sophisticated, imaginative, and unyielding concern for the market being served or created by educational R & D, that is, for the consumers, the clients, and the users of the outcomes...." (p.14).

Taken as a whole, Gideonse's conception of a market model for educational RDD&E represents an excellent point of departure for a volume of this kind. It not only challenges a host of assumptions that those working in the domain take for granted, but offers an alternative set in their place.

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RESEARCH AND DEVELOPMENT FOR EDUCATION: A MARKET MODEL

Hendrik D. Gideonse

Professional Staff Member, U.S. Senate Subcommittee on
Executive Reorganization and Government Research
and
Adjunct Professor of Policy Science, State University
of New York at Buffalo

Introduction

The second successive national administration--a Republican one this time--has embraced the cause of educational research and development. The Johnson Administration revised the basic authorizing legislation in 1965 and called for the establishment of a network of educational laboratories "large and significant,...comparable in their way to the large-scale laboratories of the Defense or Atomic Energy establishments,...equal in size and scope to the major tasks they seek to accomplish."[1] The form of the Nixon Administration's embrace has been the submission of legislation to create a National Institute of Education "modeled shamelessly on the National Institutes of Health."[2] The backing and the promise seems high. Why then are we in such a muddle?

Much speculation and discussion--and even some careful study and analysis--have been devoted to the role of research and development in improving educational practice. Major policy explorations have been completed, most recently the policy review conducted under the sponsorship of the Organization for Economic Cooperation and Development (OECD).[3] Commissions, study groups, White House-appointed panels, interagency review committees at the Federal level, and other groups have addressed smaller or larger segments of the problem.[4] The result of all this examination as far as policy is concerned seems to be a peculiar immobilizing self-consciousness.

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[1] Letter from President Lyndon B. Johnson to Secretary John W. Gardner, July 5, 1966.

[2] Daniel P. Moynihan, White House press conference, March 3, 1970.

[3] For a brief summary of the OECD review see my "OECD Policy Review of U.S. Educational R&D," Educational Researcher, April, 1970. The status study I prepared in connection with the review has been published by the Government Printing Office and is available under the title Educational Research and Development in the United States (OE 12049) from the Superintendent of Documents, GPO.

[4] For a report of this large number of studies, up-to-date through December, 1969, see Chapter X of Educational Research and Development in the United States. At this writing (March, 1971) two more reports should be added. One was prepared by the President's Commission on Instructional Technology and issued in August, 1969. The other was prepared by Roger Levien of the RAND Corporation under contract to United States Office of Education as a planning study for the proposed National Institute of Education.

Politically the field of educational research has been in a state of disarray. Under fire from the Congress, the Bureau of the Budget (now the Office of Management and Budget), the Office of Science and Technology, staff offices of the Department of Health, Education, and Welfare, other Associate Commissioners in USOE, the Chief State School Officers, the White House, and a swarm of self-appointed critics in and out of government, USOE's research programs have struggled, stuttered, and somehow survived, but each time at a slightly heightened level of exhaustion.

Now, barely four years after the last set was launched, new initiatives have been proposed. USOE has been pressed, for example, to move the management of the program away from the development of institutions to carry out R&D and toward the identification of specific research and development objectives which will govern the management of the program. The new proposal for a National Institute of Education which has been forwarded by the President to the Congress envisages a complete, wholly unspecified, but much needed upgrading and reorganization of the management and administration of educational research and development at the Federal level. The companion proposal for a National Foundation for Higher Education, while it appears to be a clear overlap of the proposed new Institute's functions, deserves mention, too. Finally, a new program of experimental schools originally proposed by former Secretary Finch has just been launched. Its appropriation for the first year exceeds the sum used to launch the first 10 educational laboratories in 1966.

All of this has the Congress, the Chief State School Officers, the various and sundry parts of the Federal establishment, and various constituencies attendant to educational research programs hyperexcited, skeptical, horrified, hopeful, confused, and groggy at one and the same time. It should hardly be surprising, therefore, that accepting the assignment to prepare this paper has taken on for me something of the character of "going to the mountain."

What better time could be found to take the most common, widely distributed, and basically linear and hierarchical notions about how research and development can improve educational practice[5] and explicitly turn them on their head? I propose in this paper that what is most likely to advance the field of educational R&D is not further worry and concern about the current state of the art in educational

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[5] The basis for this statement is to be found in conclusions drawn by the four OCED examiners during the course of their policy review of American educational R&D. The full report of the review is unfortunately not yet published though more than a year has elapsed since the completion of the policy review.

R&D or the nature and interrelationships of R&D functions and processes.[6] What is needed instead is for us to develop a highly sophisticated, imaginative, and unyielding concern for the market being served or created by educational R&D, that is, for the consumers, the clients, and the users of the outcomes of such research.

A Few Words About Modeling

Why develop models? What is their purpose? How can they be useful?

A simple answer is that models help us understand; they give us a sense of order to the "blooming, buzzing confusion." They help sort out functions, ideas, or activities. They help clarify relationships among elements.

But this simple answer is clearly not sufficient itself. It only raises the question why we want that understanding. And the answer, I think, relates to some kind of instrumental need, a desire to do or accomplish something. Thus, we model to understand in order that we can make better decisions, manage better, change, self-fulfill better prophecies, and so on. A critically important point: this means that models are constructed with an eye to some kind of purposive action. Because this is so, it seemed to me important to try and sketch out my goal for the educational system as far as educational research is concerned.

As I developed this paper, therefore, I tried at the same time to create a vision of the educational system as it might look if it were functioning with strong scientific support. This exercise, begun originally as part of my responsibilities as Director of Planning for USOE's National Center for Educational Research and Development, enabled me to move backwards and forwards in a continuing means/ends analysis. The conception I emerged with at the end of the appointed time for preparing this model can be found at the end of the paper. It is by no means complete, but I include it because it does provide the reader with some idea of the purpose I came to have in mind as I developed this particular model.

A second point respecting models is the usefulness of pointing out the distinction between conceptual, logical, or ideal models and descriptive or empirical models. Models can either describe present conditions or they can describe ideal states as possible future conditions. Both kinds of modeling are useful, but it is important to be clear which is being attempted. In the case of this paper, the model is future oriented to a state of affairs conceived to be desirable.

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[6] This tremendous concern for R&D functions and processes seems not to be repeated in any other field and is, I suspect, an outcome of two related phenomena: the supreme and long-prevalent methodological consciousness of educational research and the basic insecurity about our pretensions to scientific status.

A useful caveat is that, being purposive, modeling itself is a contextually related activity. Consider, for example, a complex system like a "muscle car." The position such a mechanical marvel holds in the conceptual systems of a highway patrolman (e.g., a potential law violator or perpetrator of serious accidents), a twenty-two-year-old male (e.g., an aid to amatory success), or an ecologist (e.g., a serious example of human excess in terms of the drain on human and natural resources and the pollutants added to the sky-sewer) suggests the importance of knowing where the modeler stands and what his purposes are.

The same point can be made regarding a research project or a conceptual model. To the university research administrator, the Senator exercising Congressional oversight, the Federal research manager, the scientist directing the project, and the graduate school dean who worries about financial assistance for two or three fewer graduate students, the project or model occupies a considerably different frame of reference. Thus R&D policy for education may be considered from the point of view of research scholars, policy-makers or practitioners in education, or from the peculiar vantage point of the student of social change. The same "objective" element tends to occupy very different places in the scheme of things depending upon who is doing the scheming, what his purposes are, and what the operative reward or incentive structures are.

Given these kinds of understandings about modeling, it is important to state that what follows is future oriented, instrumental, ideal rather than actual, and oriented more toward the contextual settings of policy-makers for educational research and development rather than performers of such research or the users of its results.

Applying this view of modeling to the immediate task, I am asked, "Why model educational R&D?". My response is that I wish to understand it better. And, if I am then asked, "Why?" I reply that I want to understand it better so that R&D management can be improved. And, if I am then asked why I want to improve research management, I am pushed to a still higher order goal. My response is that the ultimate interest is in improving the service of our educating institutions to learners of all kinds.

Means-ends analyses of this type are important because the characteristics and requirements of ultimate ends tend to shape the means that are chosen. They establish important parameters of action by projecting their shadow backwards from the desired goal or purpose to the present real field of action.

Hence it becomes important to know what the frame of reference of the modeler is, how he views the ultimate end toward which his model-building is aimed, and what his operating assumptions are about the field or problem on which he is working.

Basic Assumptions

It is important to identify what assumptions have been made in order to be able to undertake modeling, to know what the modeler takes as his givens.

Certain assumptions or judgments have been made which affect the process of developing a conceptual model of the application of research and development to education. In the present instance I have been able to identify three areas where basic operating assumptions need explication. These areas are the political and social character of behavioral and social science, the character of change in large social systems, and the political structure of education.

Unique Characteristics of Behavioral and Social Science

Much has been said about behavioral and social science. It has been called "soft" as opposed to "hard." It is dreadfully undersupported vis a vis the entire science budget in the Nation. It is oftentimes controversial and tends to be subjected to much more careful scrutiny than biomedical or natural sciences.

All of these statements are true. The point I would make here, however, underlies all those mentioned above and I think serves in large measure to explain them. The key question is how, if at all, the behavioral and social sciences (of which educational R&D is a part, in fact, the largest part) differ from other branches of science.

For more than six years I worked as an administrator and planner of educational R&D. Month after month, year after year, I found myself continually amazed that scientific inquiry in the field of education should be the subject of so much foot-dragging, criticism, and controversy regarding policies, procedures, and support. No one appeared to understand what was being done or, if they did, agree with it. Everyone wanted to study it interminably. And despite the study, it is amazing how little seems to have been learned if the criterion is altered behavior on the part of policy-makers. Thus we have the spectacle of a Counselor to the President and his staff on at least two occasions after the decision had already been made to press for the National Institute of Education (and presumably the staff work completed justifying that choice) offering the following evaluation of the field of educational R&D:

(a) The Coleman Report showed certain target groups in American society were not being served by the schools as evidenced by their nonattainment of equal distribution curves of achievement.

(b) The report further showed that the reason for this was that there did not exist adequate differential arrangements for the allocation of instrumental resources (e.g., dollars, trained manpower, curricula, techniques, etc.) so that equally distributed achievement patterns could be produced by the schools for varying target groups.

(c) If educational research and development had been performing well, it would have produced those techniques and systems of differential resource allocation.

(d) Since they do not exist, educational R&D has clearly failed.

(e) Therefore, we need a whole new initiative in this area.

On the basis of the Coleman Report? After having listened to this analysis, about all one can wish is that the Counselor in question had read his own words on the misapplication of the social sciences in the cause of policy development at the Federal level!

Financial support since the original burst of enthusiasm in 1965 has been begrudging and, in terms of purchasing power, declining. The political scraps and antagonisms within the Federal executive establishment, between it, the Congress, and the research community, and between all three and the educational establishment have been wondrous to behold. The result of the controversy has been disappointment, delay, procedural aberration, systematic encroachment on established administrative authority, and executive timidity.

Only recently have I been able to articulate why this should be so and how the fact that it is, is probably the single most important characteristic of mission-oriented behavioral and social science research.

Let me phrase it in the following way. The natural, physical, and biomedical sciences work on variables or entities that are different from those worked on in behavioral/social science research. The essential difference is two-fold. In the behavioral and social sciences virtually all of the objects of research or variables under study possess (or act as if they believe they possess) free will; and, second, they are inextricably imbedded in a value structure of some kind or other.

Let me be very clear about what I am saying here. I am not saying that the outcomes of physical sciences, biomedical sciences, etc., do not relate to choice or values. Clearly they do. What I am saying is that the materials, units, and variables with which and on which they work are not themselves self-conscious, possessed of free will, or value laden. For example, atoms do not choose nor do chemicals or glands. But learners, and parents, and society, and institutions do. Rats and mice possess no human values (though we may anthropomorphize them from time to time). Neither are human values involved in the immediate intricacies of a high-energy physics experiment. But learning itself is a value; failure in its achievement in an experiment involving real children or adults is a value question; and, all matters involving education or welfare or social futures are inextricably bound up in questions of worth and propriety and preference.[7]

The understanding is crucial. If behavioral and social science research is in its practice, as well as its implications, value-laden and choice-rich, then science as it is practiced and managed in support of education is as much a social and political activity as it is a scientific one. This is an extremely important, if complicating, organizing principle. Its implications are far-reaching. It affects who does research and development and where it is done. It forces a reconsideration of the decision-making structures which should exist for a behavioral and social science research program not only at the policy level where the objectives and targets are identified, but also at the technical level and perhaps even within the R&D operations themselves.

A political and social conception of behavioral and social science renders more immediately meaningful the remark attributed to Bernard Berelson when asked what he had concluded, having completed a huge compendium of research in the social sciences. He replied that the social significance of a research study is inversely proportional to its scientific quality.[8] While apparently antiintellectual on the surface, Berelson's remark reminds us that it is people, not things, who are affected by the behavioral and social sciences. And if the people who are to use that knowledge cannot understand it, or if it is so esoteric as to have little credibility,[9] then one can question in what sense it is "knowledge" or whether it should be imbued with power to affect decisions of any kind.

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[7] Another way of saying the same thing is that in the behavioral and social sciences men are inside the systems being studied rather than outside. While the physical sciences are beginning to encounter some analogous problems as the act of measurement alters the phenomena under study, the implications for the behavioral and social sciences of perception, judgment, feeling, attitude, and value are clearly much more problematical.

[8] Reported by Lewis Eigen in Reappraisal of the Educational Technology Industry, Urban Research Corporation, 1969.

[9] Because it has either sharply limited the variables or related them to one another in complex mathematical ways.

Change Processes in Social Systems

A second basic assumption or operating principle focuses on the process of social change. The argument is easy to sketch out. The educational system is a social system. The purpose of science is to develop understandings or knowledge which hopefully can be applied in some fashion or another to achieve desired human ends. The application of science to human or social systems is rarely a process that can be accomplished purely by decisions taken at critical points or times in the administrative structure.

Change in a social system is not so much logical as it is psychological, social, or political. We speak, for example, of an "idea whose time has come." What this means is that somehow a widespread willingness has developed to accept and act on the basis of a new conception or knowledge of some kind. But the phrase also implies a bit of knowledge in its own right, namely, that in social domains the "whose time has come" part of the phrase is far more important than the "idea." In other words, the conditions which create a readiness in a social field to accept an idea from science are more important as far as adoption is concerned than the idea itself.

Hence the twin phenomena we find in all social fields. On the one hand we see the nonadoption of strong ideas in the absence of readiness. On the other, we have faddism which is nothing more than readiness to adopt in the absence of knowledge, a readiness which is soon disappointed by the low power of the innovation. The point is simple. For the improvement of education to come from science, the conditions causing practitioners and policy-makers to attend to the ideas emerging from science must be established parallel to and as part of the support of science itself.

The Political Structure of the Educational System

My assumptions should also be clarified respecting the political structure for education. At present the educational system in the United States is multijurisdictional in character. Primary initiative for policy rests by constitutional authority in the States. Most of the States have in turn delegated this responsibility to local school districts. Any purposive model of educational research and development needs to address head-on what its assumptions are about the present and future character of the major decision structures for the educational system as a whole.

In this regard I want to make clear my assumptions that policymaking respecting instruction and curriculum will continue to be decentralized. I hold this view not because that is the way it is now and, being strong, it is likely to continue that way. Rather than seeing such a situation as anachronistic (as many people do these days though perhaps not openly admitting it), decentralization is very much the direction that is being made possible and is in fact occurring in a variety of other areas in the contemporary world. The communications revolution and, cliche though it may be, the general elevation of the level of popular knowledge make possible and indeed create demands for decentralization that would have been thought inconceivable (if not undesirable) a decade or two ago. The telephone, the Xerox machine, and the mass media assure the availability of information to large numbers of people. The immediate presumption is that good communications strengthen the center by making it possible for everybody to get the right word. What actually happens, though, is that people who are close to the action now not only know what *they* know, but they also know what the policy-maker at the *center* knows. In such circumstances the demand to make decisions at the periphery will be loud and insistent. This trend is likely to continue at, I believe, an increased rate.

These assumptions respecting the political basis for the institutionalization of education is nationally specific (meaning that it is linked to a particular culturally imbedded structure for education). My conclusion is that it dovetails with the earlier expressed view of the political and social character of behavior and social science. It is a different point, however, not an identical one.

An observation here might be useful regarding the degree to which this assumption of decentralized policy development and execution and the assumption about the political and social character of behavioral and social sciences relate to one another. I recently attended a UNESCO-sponsored working party at which we discussed the application of systems analysis to the problem of innovation in education, with particular reference to educational technology. One of the key items on the agenda was the consideration of what the UNESCO Secretariat called conversion strategies or what is referred to in this country more often as diffusion or change process. That the question was as much political and philosophical as it was instrumental became clear as important differences emerged between Cartesians and empiricists, between French-speaking and English-speaking, and between nationals from centralized systems and nationals from decentralized systems. The English-speaking, empiricist, decentralized system representatives seemed generally to worry much more about change process that the Cartesian, French-speaking, centralized system participants.

Several intriguing questions arise from this observation. For example, to what extent are we observing an instance of the Whorfian hypothesis that language carves out the reality we see? Does the logical-derivative character of French as a language affect their perceptions of change problems in ways different from the empirical-generalization character of English? Does the language itself only express the differences implicit in basic philosophical distinctions between empiricists and rationalists which in turn tend to produce decentralized vs. centralized educational systems? And most intriguing of all, does what one *believes* affect in an objective way the kind of problem which exists? For example, the Americans and English tended to give short-shrift to the notion of the printed word as an effective conversion strategy. But the French and Belgian representatives insisted that for them publications were not only effective but essential, especially if the publications came from the center.

This aside illustrates some of the dimensions of the problem with which we wrestle as we build models, and in particular, the possibility that in the field of behavioral and social science policy we may not be building universal models but rather national or culturally-specific ones.

A Market Model of Educational Research and Development

From the basic assumptions and other considerations developed above --the purposes and contextual relatedness of modeling, the political and social character of the behavioral and social sciences, and the socio-psychological dimensions of change in social systems--I am led to one compelling conviction. Educational research and development must be conceived in terms of the market, consumers, and clients it is supposed to serve. Only after that principle is firmly established should attention be directed to the processes, techniques, and functions which might accomplish that service.

Prerequisite to the application of science to education is the examination and redefinition of what the education market is, what it means to consider clients or practitioners as a "market," and how to translate market requirements (conceived either in present terms or desired future terms) into product or outcome statements that will provide useful guidance to the development and management of research and development policies and practices. Successful innovations derived through research and development are more likely to arise from careful consideration of market requirements or possibilities than from the theoretical and technical possibilities emergent from R&D by itself.[10]

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[10] These conclusions were formulated well before I encountered a monograph published by the National Science Foundation (NSF 69-17), Successful Industrial Innovations, by Sumner Myers and Donald G. Marquis. After stating their primary conclusion that technical change was to a significant extent based on the cumulative effect of small, incremental innovations, their second conclusion was that "recognition of demand is a more frequent factor in innovation than recognition of technical potential." The only caveat I would make respecting the idea of a market model is that I am not referring here to any notion of "free market economies" wherein that which sells best is "best," or somehow foreordained, or good. In short, sales are emphatically not the criteria which determine success. The criterion referent which is most important, ultimately, is client satisfaction--are individuals and the society receiving from education what they desire?

A Conceptual Turnabout

Theodore Levitt, writing 10 years ago in the *Harvard Business Review*, analyzed the phenomenon of growth industries.[11] He was interested in exploring what a growth industry was and what kind of advice he might give regarding any given industry's position with respect to such growth. Levitt concluded that there was no such thing as a growth industry *per se*, only far-sighted, successful management. He concluded industries were threatened, slowed, or stopped not because markets were saturated but because there had been a failure of management.

Levitt presented brief analyses of railroads and the Hollywood film industry as classic examples of old "growth industries" gone sour. He described dry cleaning, electric utilities, and oil as industries in the shadow of obsolescence. He concluded that there was no such thing as a growth industry, only "companies organized and operated to create and capitalize on growth opportunities." Levitt (1960, pp. 47-48) identified four conditions which usually guaranteed the cycle of bountiful expansion and undetected decay:

(*a*) The belief that growth is assured by an expanding and more affluent population.

(*b*) The belief that there is no competitive substitute for the industry's major product.

(*c*) Too much faith in mass production and in the advantages of rapidly declining units costs as output rises.

(*d*) Preoccupation with a product that lends itself to carefully controlled scientific experimentation, improvement, and manufacturing cost reduction.

Levitt's article then analyzed these four conditions in some detail. The central conclusion he arrived at was that healthy industries see their primary role as customer-satisfying rather than goods producing.

> "An industry begins with the customer and his needs, not with a patent, a raw material, or a selling skill. Given the customer's needs, the industry develops backwards, first concerning itself with the physical

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[11] Theodore Levitt, "Marketing Myopia," *Harvard Business Review*, July-August, 1960, pp. 45-46.

> *delivery* of customer satisfactions. Then it moves back further to *creating* the things by which these satisfactions are in part achieved....Finally, the industry moves back still further to *finding* the raw materials necessary for making its products " (p. 55).

Of course there are some obvious problems in directly applying the form or the conclusions of any analysis of the production of goods or the health of a business or industry to the social service domain. But there are intriguing points of comparison which can be made. For example, we might define the customer's needs as those skills requisite for success in school and the delivery system choices as inschool mechanisms, or new institutions like Head Start, preschool television programming, or whatever. Educational development would then entail constructing the programs, organizational models, instructional sequences, and staff capabilities. And, the raw materials would include the knowledge base in both its specialized forms and as it exists widely diffused about us all.

But the most important comparison of all is the distinction between producing goods (or services) and satisfying customers. The key point for the purposes of this paper is that those industries that have maintained a posture of satisfying customers have thrived; those that have concentrated on producing goods have either stabilized or gotten into serious difficulties.

Applied to educational R&D Levitt's conception leads to a fundamental reorientation of the status hierarchies implicit in classical research-development-dissemination-adoption (R-D-D-A) models of educational research. It suggests, for example, that before research and development can be used ("bought" in the literal and figurative senses) it must be delivered; and, before it can be delivered it must in some sense be needed (even though the need may have to be "created" rather than merely identified as preexisting). A market model suggests, therefore, that attention to the conditions for change precedes the search for and development of specific changes. It suggests that how we are to reform and improve education shapes how we define and use research and development to that end.[12]

The market model entails giving up as futile the idea that the educational system will change as a consequence of external levers of research and development. Rather than being the lever of change, research and development is the fulcrum. Adoption of a market model for conceptualizing and managing educational research and development, however, should be done with the understanding that it is largely content-less with respect to specific models of the interrelationship of various research, development, or research-related functions. In that sense, the market model defines the game, not the game plan. Linear models might fit. Linkage models might fit. Output models, process models, or feedback models might also fit.[13] While later on I propose ways of conceiving of research and development which seem most generally compatible with the market notion, the point is that the examination of the conditions, reasons, and requirements for change within the educational system itself is the first necessary step in the improvement process.

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[12] This, of course, is the reverse of the operating assumption of OECD examiners encountered in their discussions across the United States with researchers, developers, and policy-makers of different kinds. They found the most prevalent view was that how research and development was pursued would determine how the system would change and in what ways. In short, the examiners discovered a much stronger belief and concern for the product and its potential efficacy than for the market or customers being served, however the latter might be identified.

Another implication of the market model is that the primary referent of concern should be the client (conceived of as either learner or educational practitioner--more on this later) rather than scientific theory. This is similar to Levitt's idea but casts it specifically in terms that are more commonly associated with educational research. By asserting the prime importance of the client and the practitioner, it makes all the participants--theorists, scientists, engineers, policy analysts, teachers, administrators, and the learners themselves--equals in a transaction (after Eric Berne) process. The central feature of that process is co-equal presentation of needs, knowledge, problems, and possible solutions. The status hierarchies implicit in some models of research and development dissolve in the market model and are replaced by transactional processes of confrontation, bargaining, or negotiation among equals.[14]

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[13] See Chapter I of Educational Research and Development in the United States for discussion of the terms used here.

[14] This conception seems entirely compatible with ideas developed by Sam D. Sieber in his paper "Images of the Practitioner and Strategies for Inducing Educational Change," Bureau of Applied Social Research, Columbia University, February, 1967. Sieber presents four strategies for change based on the images of the practitioner as rational man, cooperator, powerless participant, and status occupant. He analyzes each in terms of the locus of change, the channels of influence, the change agent, and the efficiency of the change measured in terms of effort, coverage, and yield. Sieber's preferred status occupant strategy based on the writing of Merton and Gross, Mason, and McEachern, while using quite different language and concepts, comes very close to expressing the same kind of transactional concept identified above.

How is "Market" To Be Defined?

One of the most powerful features of the market model is that it forces consideration of who the market really is when discussing educational research and development. For starters, what seems quite clear is that the market is not primarily researchers and developers operating in the field of education. While saying this may be obvious, much of the rhetoric spun out over the past 10 years or so about educational research and much of the actual decision-making respecting educational research has had the operational effect of attending more to the needs of the R&D community as a market than to schools, practitioners, parents, or children.

The market model focuses attention in quite different directions. It leads to questions about which market, how we are to conceive of it, and what our time frame is.

Is the system or the client the market? The first prime issue arising from the market model stems from considering who the market is: the system which carries out educational functions or the clients being served by that system? In short, whose needs (should) define the market?

Careful attention reveals that as an economy, education, like all social services, must be considered in a rather different fashion. In most market economies with which we are familiar, the consumer, ultimate purchaser, or user are all the same person be he individual or corporate. For social services, however, the ultimate client or user is only rarely the direct purchaser. In fact, it would be far more accurate to say that the ultimate client for education, relative to the service being offered, stands more often as recipient rather than consumer.

In a sense, I am playing a word game here, but it is an important one. For by the term "recipient" I mean to imply a degree of passivity. This can be contrasted to the more active, capable-of-demanding-accountability implication of the term "consumer." In fact, the buyers of behavioral and social technology for use in education are almost always intermediate to the ultimate beneficiary. The fact that the market as purchaser is intermediate to the market as ultimate recipient of services is of crucial importance. The market model causes this question to be raised in head-on fashion.

A second sense in which attention needs to be directed to the issue of who the market is and who the client is lies in the classic tension between individuals as clients and the society as client. Heightened focus on the market and how it is defined assures that this concern will not be glossed over. No claim is made here that only a market model will cause the individual/society issue to come more sharply into focus. Rather, it appears only that such issues are more likely to be addressed systematically and continuously as a consequence of the particular perspective that the market model affords.

Actual or present markets vs. ideal or future. A second key issue surfaces almost immediately. Should existing needs as currently defined by client groups (in either sense as discussed above) constitute the market or should the market be conceived in terms of needs defined if conditions and understandings were as they should be? Does a market model require that customers be satisfied only immediately or in the long run, too? Does it mean that R&D has to provide products which meet felt ("low-level") needs or can it hope to meet real ("high-level") needs?

I have deliberately used ambiguous and perhaps loaded language in these questions. I wish only to make clear that there is an issue here which needs to be dealt with. It can be perhaps most bluntly explicated by stating that there are any number of people in R&D and academia who believe that they know better what the needs are than clients or practitioners do. Whether the belief is justified is a problem in its own right--a political problem, too, I might add, since it deals with fundamental questions of who has the right to define and choose means and ends in this domain.

One way to deal with this kind of problem is through the systematic use of means/ends analyses and in rigorous comparisons of actual accomplishments to those which are desired. Means/ends analyses can help resolve the market question by producing rigorous dialogue focusing on whether that which is desired will really have the effects or outcomes intended. Attending to discrepancies between desired and actual achievements of the educational services will similarly yield important input for resolving which needs statements of practitioners or clients have priority (presuming, always of course, that the statements of desired outcomes have legitimacy and standing).

What is most important, however, is the pressure to hold a dialog between clients (or their representatives), practitioners, and performers of R&D to iron this question out in a manner satisfactory to all. We come back, in short, to the notion of a continuing transactional process among equals.

Other terms for considering this question are more common to industrial research operations. One finds reference in such settings to concepts of "defensive" and "offensive" research. Defensive research is that undertaken to improve the efficiency, effectiveness, or cost of existing products, services, or functions. Offensive research is that conducted to develop wholly new product lines serving newly defined customer needs or which replace an existing product by one which comes at the need in a wholly new way.

Thus defensive research by a corporation would improve detergents; offensive research would work on synthetic fabrics which resisted or prevented soiling. Defensive research would improve gasoline for auto fuel; offensive research would allocate large sums to the development of acceptable electric or steam automobiles. Defensive research would improve teachers' behavior in the classroom; offensive research would develop home television programming which attempts to guarantee that children will enter school with an established competence in reading, writing, speaking, and listening.

Perhaps most important, however, in considering actual vs. ideal markets for education is the problem of delivery systems. Levitt asserts that after needs are considered, the first thing to be addressed, even before a product or service is defined, is the nature and adequacy of the systems for delivering customer satisfaction. This point is critical, especially for the educational system organized as it is. Decentralized, hierarchically structured in the bureaucratic sense, it is curiously "flat" if the object is to reach nearly three million teaching professionals. All sorts of innovations might conceivably be designed, tested, and validated; but, if there is no delivery system, then they can be introduced only with the greatest of difficulty, if at all.

It is with respect to this issue that some of the most difficult problems will surely arise. The existing system is not geared for renewal. Its structure does not provide easily for the continuing education of professionals; its incentive systems do not stimulate individual initiative as in other professional fields.

Here is where the vision of an ideal system sketched in at the end of this paper may serve a dual purpose. Not only does it constitute an important part of the conception underlying the market model, but it comprises a beginning statement of a more ideal market as a delivery system. It constitutes, therefore, a reference point in the future against which certain kinds of change-enabling R&D work might usefully be done.

The Conceptualization of Research Functions Under the Market Model

Conceiving of R&D functions in a market-oriented fashion helps get us out of at least one box in which we have struggled periodically. Over the past few years a number of analytical tools have been developed to help plan and manage research programs. At first it was thought that if we could develop clear, simplified terms grouped in such a way that all the terms in a given class were mutually exclusive, we would have powerful tools which could then be used to decide where funds should go for R&D purposes. Several times we tried playing what we came to call the poker-chip game (e.g., if you had 100 poker chips how would you allocate them to the categories in this particular class or dimension?).

This proved satisfying until we realized that it still did not tell us what should be done within each category with the dollars represented by the chips. Further, we realized soon that the allocation of dollars within single classes became immediately suspect as we moved to the consideration of allocations within second, third, and fourth classes. The relevance of this to building conceptual models lies in the fact that one of the classes or dimensions in which we tried to play the poker chip game embraced the categories of research, development, demonstration, dissemination, training, and construction. In the context of this paper, the discovery that it was no more useful than any other dimension for decision-making means that considerable caution should be exercised in using a conceptual model based on classification schemes of R&D functions as a basis for R&D policy- and decision-making.

What we learned is that for purposes of planning and allocating resources, it is the problems, goals, and objectives which must be firmly in mind, rather than taxonomies. Once the goals and objectives are determined (and that is a political and, I would argue, a market analysis process) then it becomes possible to derive what the specific activities and, therefore, allocations ought to be.

Lest these comments appear totally destructive of taxonomies let me hasten to add that they are still useful heuristics. They help to inform policy-makers by insuring that all the options have been explored and that in decision-making nothing has been inadvertently omitted from sight or consideration.

The conclusion of this brief discussion of taxonomies, however, must be that developing a taxonomy of change processes or research functions does not appear particularly useful as a conceptual model for research and development if the purpose of the model is to provide guidance for top-level policy development, planning, and execution.

Most research models developed in the past have addressed attention to how the several functions identified in various taxonomical approaches to research and development relate to one another conceptually, chronologically, empirically, or administratively. The market model suggests that those functions should be viewed in terms of their relationship to increased customer (client) satisfaction. In this light the definitions and views developed below are offered.

The key distinction which requires delineation is that between research and development, between science and technology. The purpose of research or science is the production of verifiable knowledge. The purpose of development or technology is the creation of capabilities to perform specified functions or achieve specified outcomes where that capability did not exist before. Both definitions are broad and therefore require further elaboration.

1. Research. Michael Reagan (1967) has effectively disposed of the problem of distinguishing between basic and applied research in the behavioral and social sciences by the simple expedient of denying its meaningfulness. Reagan pointed out the many reasons for being dissatisfied with various of the proposed criteria for making the distinction. More compellingly, he also demonstrated that there is virtually no research which might conceivably be done in behavioral and social science which could not be easily connected to a real potential policy application of one kind or another.

If the basic and applied distinction holds little promise for our purposes, application of the market concept begins to look a little more useful. Basically, it is possible to identify two potential user classes (markets) for the knowledge products of research. Ongoing or proposed research can be classified into that which will be primarily useful to decision-makers of one kind or another.

The research which is useful to other researchers will tend to be theoretically oriented, looking for clues for further research, micro rather than macro, interested in exploring a few variables rather than many, and so on. For research oriented to decision-makers, it should be possible to specify what decisions might be made on the basis of the research before it is completed. It will deliberately play with many variables rather than a few, be more frequently macro, and so on. (An important type of decision-oriented research would be those many studies launched explicitly to further the achievement of a specific, identified development goal. Each study undertaken within such a frame of reference is clearly decision-oriented in terms of the development goal identified.)

The distinction proposed here is not a new one. The National Academy of Education volume, Research for Tomorrow's Schools, (Cronback and Suppes, 1969) propose that we consider the differences between conclusion-oriented and decision-oriented inquiry (pp. 19-27). While they include development within the category of decision-oriented inquiry, it makes more sense to me to exclude it and preserve the distinction only within the research or science domain itself.

2. Development. The definition of development that I offered above is broader than most. Its breadth is a consequence of the basic assumptions which led me to the market model.

In education we have come to understand that development is a systematic process resting insofar as it can on the knowledge produced by science. The objective of the process is to create products, materials, techniques, and processes which accompish, at an acceptable cost, objectives specified in advance and deemed desirable or required by learners, professionals, or society. These are the usable products of R&D or in Levitt's terms, the things which are designed to satisfy the customer.

The broader definition (development as the creation of capabilities that did not exist before) is the consequence of important differences in the production and delivery of new capabilities in behavioral and social technology in comparison to "hard" technology.

Once a capability is demonstrated in computer sciences, electronics, aircraft technology, or housing construction, the further delivery of the capability is typically one of selling and purchasing a hard product. We know where to go to buy it; once we've bought it, it's ours.

Social and behavioral technologies are different. They cannot be bought in the same fashion. Much more frequently the application of social technology means the painstaking development of a new skill or technique in a vast army of people who currently occupy the professional positions in the social service field in question. On the view being offered here, the development process is not completed until the requisite skills and human capabilities have been successfully incorporated in the professional repertoires of practitioners.

In summary, I would make three points. First, reinforcement is given the idea that the leading distinction about R&D activities pertains to the outputs of those activities.[15]

Second, more careful thought needs to be addressed to the expanded definition of development. At the present stage of thinking, however, it makes good sense to include the development of professional capabilities respecting the newly created behavioral or social technologies for education as part of the development process. Conceiving of it as part of development would assure direct attention to this problem by developers and those who make decisions to support development. It also tends to underline the critical role of practitioners in the development process. Finally, it suggests important modifications which soften the unfortunate unidirectional implications of existing concepts of diffusion and delivery systems.

Third, more careful attention needs to be given to decision-oriented inquiry for education. My own preference would be the broad extension and installation of something like the CIPP model of evaluation (context, input, process, and product evaluation) throughout the agencies and institutions engaged in or relating to the practice of education. This proposition is another way of saying building in and using an operations research capability in educating agencies of all kinds. Evaluation broadly conceived as in the CIPP model is a research activity aimed at decision-makers of various kinds and at various levels. The better and more sophisticated the inquiry in the name of evaluation, the more useful it is to the decision-maker.

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[15] Cf. my "Research, Development, and the Improvement of Education," Science, Volume 162, Nov. 1, 1968, pp. 541-545.

Implications for Decision Structures

The model clearly stresses system or client need over R&D process capability. This focuses attention on the importance of collecting and analyzing data on client desire and need, societal need, school performance, and educational output. Data on these different factors then need to be placed in some kind of decision format.

The specification of educational ends and the allocation of educational resources to achieve those ends is a process which takes place at many levels in our society. It occurs within schools and other educating agencies like the home or the mass media, within local and State educational agencies and their governance structures, and within the Nation. This process is one in which we all participate as citizens, in more or less direct or immediate ways. While as professionals or scientists we may have a role in saying what is feasible, in the choice of ends we have no greater or lesser status than any other human beings.

Decision structures are important because they are the framework for determining what the desired outcomes of research and development activities are or what targets R&D should attempt to reach. (By target I mean the production of specific desired end-states for learner-client groups or client systems.) The market model requires a considerable opening and clarification of the decision-making process in educational research from its present relatively closed and muddy state. At the Federal level, for example, only a relatively small number of groups presently have effective access to the decision-making process. Even this is a smaller set than seeks access. The market model implies that many groups--those that have been seeking as well as those who have not yet been seeking--deliberately need to be brought into more formal, substantial, and public processes of decision-making on educational R&D at the national level. The marketplace in education is a political marketplace. Its decision structures need to reflect more fully that phenomenon.

What is true at the Federal level is even more true at State and local levels. But here the emphasis is somewhat different. If the ends educational R&D are serving are political, then political structures need to be created or utilized to determine them. But, if the educational system is decentralized and the determination of educational policy is thus also decentralized, the model suggests that unlike natural or biomedical science, much more attention needs to be directed to the role of local and State educational agencies regarding the organization and performance of research and development functions. This should extend as well to the determination of certain kinds of R&D objectives. This is even a more difficult problem than the Federal decision structure since at present there is very little of such involvement (with the notable exception of the regional educational laboratories) and, perhaps even more significantly, there are so few R&D activities to be found in State and local agencies to make meaningful involvement even desirable.

Finally a third way of viewing the implications of the market model for decision structures for R&D is in terms of the transactional processes implied by this way of viewing the research and development world. In psychoanalytic terms the old "father-son" (hierarchical) relationship of research to practice (or of therapist to patient) gives way to a negotiation process of "adult to adult" where both researcher and practitioner (or therapist and client) expect to change in significant ways as a consequence of encountering one another. While difficult to operationalize in the abstract, drawing out the implication in this way should lead to interesting and perhaps provocative insights regarding the present realities of the relationships currently being displayed by participants in R&D and thereby suggest some new directions that might profitably be explored.

The idea of negotiation, bargaining, or consensual processes as key element in decision structures for educational research and development is a reflection of at least two fundamental propositions resident in the model. It is based in a recognition that R&D processes are linked to one another in complex ways. Primacy of input from one or another of the participants in any linear fashion is virtually impossible to establish. Second, negotiation as a concept also flows naturally out of the idea that the practice of research and development in education is a social and political process as well as a scientific one.

It is possible to think of several examples of new decision structures for research and development which might be constructed on the basis of the principles described above. One which appears to have some merit and ought to be carefully considered is the idea of holding public hearings across the country on a regular basis (perhaps every two or three years) in order to secure systematic input leading to decisions as to what kinds of development activities to launch. By providing an opportunity for the many constituencies of schools and within schools to present their ideas about what is needed, a much more substantial basis will have been built for making decisions. The choice of public hearings is not a happenstance here, but rather an explicit attempt to employ a technique used by political bodies (legislatures) for an R&D area which also has strong political dimensions.

A second possibility is to make much more systematic and open use of "administrative lobbyists." While legislative lobbyists are often subjected to sharp criticism (and they sometimes deserve it), it is a well known fact that our legislative system could not function without them. Conceiving of, identifying, and then making use of administrative lobbyists might well be a way of assuring a continuing contact with important interest groups in education who can provide information and expertise and who also need themselves to be informed by scientific developments and technical possibilities which seem to be emerging from the work now being done.

Use of groups like this has been sporadic and unsystematic. It has been guided more by vague notions of sharing information (but not too much) and trying to "build constituencies." Even the latter aim has been more often viewed as necessary because of the threat of their negative influence, rather than necessary because research in education is of its essence political and therefore linked to the market it is designed to serve. Using professional organizations, either through their professional staffs or their members, to build their contributions into planning and program development in a regular way would be an important alteration in existing decision structures.

A third possibility fully compatible with the two suggested above would be systematically to make all program documents associated with educational research available to key groups for comment. This would apply not only to the Federal program but to State research programs and perhaps even the basic program documents of such large research organizations as educational laboratories and research and development centers. Such procedures would assure opportunities for various constituent groups to provide information, advice, and feedback. Information of this kind can provide useful correctives or materially strengthen existing or proposed initiatives.

A fourth possiblity, more in the nature of feed-forward than feedback, is to take the simple expedient of publicly announcing the dates by which certain kinds of decisions have to be made or documents have to be prepared. This would provide an opportunity for strongly motivated or interested individuals and groups to submit data, analyses, or proposals respecting the direction and development of the research program or its several parts.

Finally, a fifth possibility is to press for much closer and more continual Congressional oversight of educational research and development. This idea, advanced several times within the confines of the Office of Education during the past three or four years, was regularly--I am tempted to say routinely--rejected as likely to cause more harm than good.

Up to the present time Federally supported educational research programs receive virtually no public hearing. Appropriations hearings in the Senate have tended to deal with the matter in a perfunctory manner; in the House the appropriations hearings are held in executive session. The current legislation authorizing educational research is somewhat unique in having no expiration date, but the consequence of this is that the matter does not come up before the substantive committees of the Congress.

The legislation proposing the National Institute of Education offers some promise of change. Public hearings are being held, but even the bill as currently drafted makes no provision for regular oversight hearings if it should be enacted. Certainly one way in which decision structures could be made to reflect more adequately the political dimensions of educational research would be to render the Congressional oversight function more explicit and more frequent. This recommendation will not be popular among the administrators of research or certain segments of the science community, but it is rather directly implied by the propositions underlying the market model.

The above listing does not exhaust the possibilities, but it does give some illustrations of the kinds of techniques which might be explored. Key criteria for decision structures designed to reflect affinity to the market and the political character of educational research would be openness, accessibility to all appropriate groups and individuals, and responsiveness in the face of that access.

The Market Model and Institutional Development

If research managers and policy-makers adopted the market model, how might they come to view the needs for institutional development of the rich panoply of research and related functions?

Probably the first realization is that, regardless of the model that research managers in the past may have held (if indeed they held any at all), what has happened in this country is largely an institutionalizing of the classic linear model. Like all generalizations pertaining to social enterprises, this one can be faulted by individual cases here and there. But I think it is nonetheless an accurate one.

Virtually all of the activities classed as research, for example, are to be found in the universities. As a group the Research and Development Centers funded by the Office of Education are primarily research operations. Some of them, to be sure, have moved to prototype development when theoretical groundings appeared to have the strength which would justify such a step. The educational laboratories, while displaying considerably and, to my mind, extremely healthy and stimulating diversity, are basically either development institutions or serving as linkage mechanisms between existing development and school and professional audiences. Demonstration activities have been the province of Title III of the Elementary and Secondary Education Act. Thus we have a picture of different stages of the R-D-D process being independently institutionalized.

In practice, of course, there has been no--or very little--flow between these institutions to justify and claim that they fulfill the requirements of the linear model of R&D. While a couple of instances of such flow can be found in the relationships between R&D centers and education laboratories--notably Pittsburgh and Research for Better Schools, and Stanford and the Far West laboratory--by and large not much has moved from the work being done by those institutions primarily engaged in research, through those primarily engaged in development, to those primarily doing demonstrations, and finally to operating schools and colleges. In some ways it would be surprising were it so, since the programs are so new it would be difficult for the relationships to have been established and, in the case of Title III and the laboratories, the demonstration projects were awarded before the development institutions were even created.

If the present situation respecting the institutionalization of educational research and development were to be illustrated graphically, it would look something like Figure 1. Each box constitutes a separate institution. The top illustration in Figure 1 fits the R&D models which distinguish the several functions, but do so in a nonlinear though linked way. The bottom illustration depicts the classical linear model.

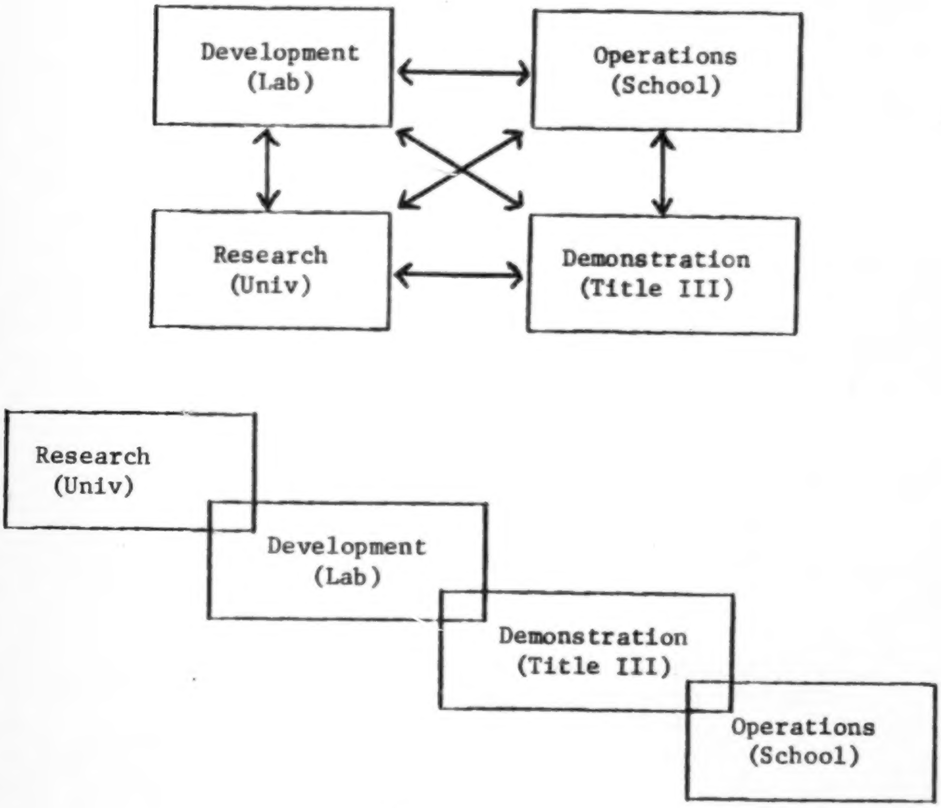
Development
(Lab)
Operations
(School)
Research
(Univ)
Demonstration
(Title III)
Research
(Univ)
Development
(Lab)
Demonstration
(Title III)
Operations
(School)

FIG. 1. Two illustrations depicting the present (linked and linear models) institutionalization of educational research and development.

The market model suggests a radically different way of conceiving of institutionalizing research and development functions. Instead of defining research functions in terms of their relationship to one another, it becomes possible to define them in relation to what their outputs are and who might use those outputs.

The next step is to inquire as to the range of potential users. In most instances these are intermediate clients. Immediately we can identify State and local educational agencies, colleges and universities, educational laboratories, the United States Office of Education, the projected National Institute of Education, and so on. Each of these institutions, the hypothesis goes, is a market. Each needs to have carried out by it or for it, in one fashion or another and with greater or lesser degrees of sophistication, activities analogous, identical, or closely related to the functions--research, development, and demonstration--we have come to call research or research related. Graphically, this would be illustrated as in Figure 2.

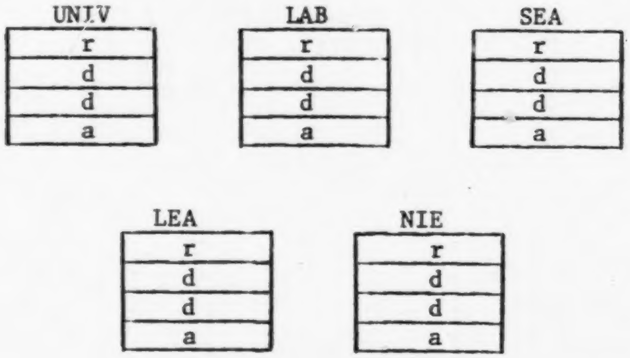

FIG. 2. An illustration depicting the presence of research, development, demonstration, and adoption functions, in several different "markets" for educational research.

A research team, for example, does more than just research. It develops research designs or new methodologies. It demonstrates their effectiveness by carrying them out, hopefully in a successful manner.

Development teams do research when they determine what kind of a development task to undertake, or what knowledge appropriately underpins the different tasks they might undertake, or when they solve the puzzles which continually confront them in the development process. Demonstrations are important testing exercises for such teams.

Demonstration programs search out the latest innovations, carry out operations research activities to insure that they have installed the demonstration properly, and carry out staff development activities to insure that the new programs will function as intended.

And operating schools carry out a variety of decision-oriented or evaluation research activities. They are continually engaged in staff development, and every successful adoption is a kind of demonstration of their continuing capability to meet new challenges and needs.

Once we accept the basic hypothesis that all institutions or educating programs (the ones listed above are only examples) require or perform functions analogous to the basic functions indicated in the classical research-development-demonstration terminology, then new possibilities begin to open up for institutionalizing systematic inquiry in the educational systems of the Nation.

Earlier attempts to define what was and was not research were basically exclusionary in their purpose. The idea was to figure out what to eliminate from view as unworthy or inappropriate. The view being pressed here adopts the reverse posture. What should be included as a legitimate part of a broadly conceived thrust toward the establishment of systematic inquiry wherever it might be needed in education? The emphasis is on transactional equality rather than status, on inclusion rather than exclusion, on the empirical rather than the logical.

Policies respecting institutional development of research for education would reflect the decentralized nature of decision-making in educational practice. Rather than reserving to the center responsibility for the bulk of the decision-making about research and development, national research management would seek to decentralize power--both authority and responsibility--for major portions of the R&D effort.

This, or course, directly contradicts the basic assumptions on which science policy operates today. While allowing argument and "partisanship" within the scientific establishment around theoretical issues which have not yet been settled, natural and biomedical science--which encompasses 97% of the present Federal investment each year in R&D--assume the ultimate ability to discover objective truth. It is basically pyramidical and cumulative in its assumptions. The operating assumption, therefore, is that the best, most up-to-date scientific talent should make the decisions as to what research to support. Since the best talent is unevenly distributed across the country, the central funding agency is required to collect the elite together periodically to make the crucial allocation decisions.

This kind of thinking needs to undergo significant alteration. An example of the thinking that needs to be changed here can be seen in the recent history of the appropriations for vocational education research. In 1968 amendments to the Vocational Education Act required that half of the research appropriation be distributed to the states on a formula basis. The Bureau of the Budget (BOB) refused to request funds under this authorization, ostensibly because of the budget squeeze, but apparently a major consideration in their decision lay in the requirement that funds should be distributed according to formula. BOB's argument was that research capability was not evenly distributed across the country and that to appropriate funds in this fashion was a dangerous precedent.

Of course, their arguments are based on the characteristics of the natural sciences. Equally important, in the absence of a rationale more suited to the growth and development of the behavioral and social sciences, their policy constitutes a classic example of a self-fulfilling prophecy at work. It is precisely the correct policy to assure that the capability does not develop!

Attention to the market, to the locus of actual need, will lead to policies of institutional development which face the fact of decentralized decision-making. This ought to take at least three forms.

1. One of the strongest needs that the market model suggests ought to be served is the cultivation of research techniques associated with the identification and definition of operational need. The entire range of research activities, most of them probably still to be invented, encompassed by the term evaluation or operations research needs to be cultivated and encouraged. This cannot be done in any other way then as broadly and as uniformly as the institutions which need such aid. All of them do. Economies of scale would suggest the importance of concentrating first on large State and city school and university systems, but the need is equally great wherever formal institutions for carrying out educational functions exist. Furthermore, the range of techniques and mechanisms ought to be as broad and varied as the types of institutions and agencies, and the goals and objectives which they are attempting to serve.

2. A second major thrust would be the deliberate attempt to stimulate the creation of autonomous institutions, scattered across the country, designed to undertake and carry out their own self-defined research and development activities in support of education. The educational laboratories were an important beginning at this. The attempt should be put back on the original track from which it has been shunted as a consequence of executive impatience, the financial squeeze, and mistaken understandings of role, function, and social science policy.

3. Finally, a third policy which would grow out of understandings about decentralization and the markets being served would be the continual searching out of alternative ways of cultivating research capabilities. The policy ought to be one of carefully husbanding new initiatives, new forms, new techniques. This requires a degree of awareness, a kind of patience, and a sense of the long view of things difficult to sustain, but, it must be done if the full promise of systematic inquiry is to be developed for education.

The emphasis I have placed here on the decentralizing implications of the market model should not be interpreted as being pressed at the expense of a strong central influence. The management at the center desperately needs the upgrading of status and role contemplated in the proposed establishment of the National Institute of Education. It desperately requires the infusion of new managerial and analytic talent that the upgrading of status will permit.

This general elevation of role, however, needs to be undertaken with a refined and sensitive understanding of the issues I have been discussing in this paper. Nothing would be worse for the projected Institute than if it were to conceive of itself as modeled on the National Institutes of Health or the National Science Foundation. It is in a different business, with different interests, and different clientele. And one of the most serious missions it will have to perform is to figure out just how to develop the best, most appropriate mix of work which it performs or decides upon and work which it leaves to decentralized agencies to identify and undertake.

Implications for Manpower Development

Two key implications emerge from the market model respecting manpower development. The first pertains to the development of the skills of systematic inquiry--the research skills, the science competencies, the capabilities associated with engineering and development. The second focuses on the idea of markets, the way in which they are defined, and the capabilities required to assess and respond to different responsibilities and incentive or reward structures.

Applied to manpower development policies, it is clear that greater efforts need to be directed (a) to the training of people to carry out the research responsibilities of operating educational institutions and agencies, and (b) to developing much finer sensitivities of the many different contexts within which personnel trained to carry out R&D responsibilities can expect to find themselves. The research functions to be performed within operating educational agencies are different from those which can be performed in more sheltered, university settings. The purposes they serve are different. The uses to which the products of such research are put are different. The reward structures vary. The markets being served are quite different and in varying states of sophistication respecting such concepts as the felt/real need distinction or the short-term/long-term distinction.

The emphasis to date has been rather heavily toward the academic marketplace. And within that domain it has been more toward the science side than the technology side. The market model suggests greater emphasis on the technology or development side, on the one hand, and on the research needs of operating school and university systems, on the other.

If Education and Science Get It Together: A Vision

At the beginning of this paper I developed the view that models are purposive in character and that they depend on the frame of reference within which they are formulated. I also suggested that they ought to be created interactively with a conception of the goal being pursued. This concluding section sets out a vision of that goal. It is a sketch of selected characteristics of the educational system as it might be if it were integrally related to science and systematic inquiry.

The Goal

The goal of the application of science to education is to build an educational system (a) whose ends, practices, and structures are based upon current knowledge, (b) whose operating philosophy has shifted from system maintenance to continuing system renewal, (c) which functions within a climate of awareness to desired and actual attainment, and (d) which, as a whole, is increasingly accountable to multiple clients, both individual and societal.

The goal statement contains the element of timeliness. It addresses directly the question of relevance both for the ends of instruction and the means.

The goal statement refers to the application of current knowledge. It therefore implies that the service of science to education is a continuing phenomenon, rather than episodic in character.

The word "system" in the definition is intended to focus attention on interrelationships as well as elements. This goal statement is designed to encourage consideration of issues "up" and "down" the means-ends "ladder" (e.g., x is an end but also a means to something else, or y is a means, but because it doesn't exist it is an end we need to accomplish).

Finally, since systems of education and instruction are never content-less, the goal as stated avers that goals and objectives are a proper concern of science and systematic inquiry. This is not to say that science establishes what the goals or objectives of education should be. That clearly is a political or social responsibility. But science and scholoarship must be used to illuminate the relationships between objectives, the consequences of achieving them, and the fit between objectives and the particular means being employed to achieve them.

A Scientifically Based Educational System

If we first assume that major systems for schooling will continue to be supported under public as well as private auspices,[16] or at least that public support will continue to be available for the purchase of educational services of one kind or another, what needs to be done next is produce a more finely-shredded "map"--a scenario, if you will--which describes in greater detail what a scientifically based educational system might look like. In developing these more refined statements, it is clearly not possible to predict in detail what the system will be, what curricular or instructional objectives it will be serving, or how its several parts will interact. But it is possible to develop a vision of a selected range of operating characteristics of a scientifically based educational system and to express the rationale behind that vision.

Governance, assessment, and accountability. An educational system operating on a firm knowledge base and transforming itself continuously as that knowledge base evolves would reflect at least two circumstances of special importance to governance, assessment, and accountability. First, the operating means of the system would reflect the extant and developing knowledge base. The techniques of instruction and the organizational structures of the institutions established to provide instruction would both be based on the most current knowledge about learning, the design of systems to foster learning, and the design of organizations and institutions to implement those systems. Second, a system based on knowledge would display a wider array of alternative forms to express the multiple ends the system is serving and the pluralistic outcomes desired by individuals and society.

These two conditions should lead to the development of governance structures and incentive mechanisms designed to increase the participation of students, parents, communities, employers, and other clients in defining instructional goals and governing educational institutions. More effective and discriminating instruments and techniques for assessing progress toward goal attainment would exist. Assessments would be available of not only stated goals and objectives but also of the secondary and tertiary effects of their accomplishment or lack thereof. Modified governance procedures will insure the reporting of these assessments in forms useful and meaningful to client groups. The availability of such instruments is likely to stimulate the development of a much broader range of instruction and institutional alternatives than exists at present.

Rationale: Goal-setting, assessment, accountability, and governance would be important in this system because instructional techniques would be effective. That is, since schools would actually accomplish what they set out to do, it would make a real difference to clients who decide what is going on there. Such a system is also likely to be more costly (but more effective). As a consequence economically-minded citizens would demand knowledge of results achieved for dollars invested.

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[16] Critics like Ivan Illich, however, raise some provocative questions of doubt in this regard. See, for example, his article "Why We Must Abolish Schooling," The New York Review of Books, July 2, 1970.

In all likelihood, policy-makers interested in major improvements in schools and colleges would not press directly for change, but would pursue the indirect route of examining actual school or college output. Confronted with the evidence of performance compared to desired achievement, teachers and administrators could either be left to their own professional consciences as to whether or how to alter practices, or public pressures might be mounted which would sooner or later produce the intended effect. The availability of effective and accurate assessment techniques would also be likely to stimulate alternative approaches to learning by creating formal routes to credentialling through assessment or appraisal which are real alternatives to the current time-serving requirements of schooling.

A widespread research capability. Assuming no change in the political structure of education, research capability would be widely distributed throughout the Nation. It would embrace research oriented to the improvement of theory and policy, engineering and development to build improved learning systems and the capabilities in professional personnel to use those systems, and other research-related activities.

Much greater resources, proportionately speaking, would be available for research, development, and research-related activities. There would be substantially greater sophistication in the policy and management models used to administer R&D. The different purposes which could be served through science would be reflected in a much broader array of research and research-related institutions and/or functions than presently exists. Thus we would expect to find different kinds of specialized institutions carrying out research, development, and related activities, but also an array of new functions within existing institutions. The research functions undertaken by schools, colleges, and other educating agencies would be equally expressive of and included under a broadened conception of research and development.

A much richer variety of techniques, instruments, methodologies, and conceptions of educational research would probably be available. These would embrace the practice of research and development, its management, and the decision structures created to determine its policies and directions.

Finally, the training and development of manpower to perform research and related functions would no longer be peripheral to the system. It would be as central to the whole educational establishment as the training of teachers and administrators now is.

Rationale: A science-based educational system will require a science establishment and research functions distributed throughout. As is the case of the operating system itself, it is reasonable to expect, given current trends, that increasing differentiation of task and function will be the order of the future here, too. Furthermore, as the political and social dimensions of behavioral and social science become more clearly understood (and perhaps here we will get some help from epistemologists on the nature of knowledge in the social domain), it is likely that our conceptions of research and development will broaden with a consequent flowering of theories, methods, techniques, and approaches.

Flexible, adaptive organizations. A solid research system producing new theories, new knowledge, new ways of doing things, and identifying new goals and objectives for education could be justified only if the institutions and individuals conceived as potential users of new information or techniques were sufficiently flexible, "aware," and in control of their own resources to be responsible and intelligent consumers and producers of innovation. It seems likely, therefore, that a scientifically-based educational system would be comprised of institutions which would display rather different characteristics than the ones we find at present.

They would need to possess much more sophisticated techniques and staff capabilities for evaluating their own performance relative to desired and stated objectives. They would need to become active seekers of practices and knowledge to enable them to achieve their objectives more efficiently and effectively. They would, in short, have institutionalized the inquiry process.

An output orientation would characterize schools and colleges. As a consequence we could expect an increase in the articulation of different kinds of institutions and credentialling mechanisms with one another in terms of both level and function.

The system would exhibit much greater differentiation of role and function within and between institutions. Such differentiation would be accompanied by greater decentralization of authority and responsibility for instructional and curricular decision-making.

Formal institutions of education and learning would exhibit much more sophisticated management systems and techniques for acquiring, processing, and using information in order to be able to justify and implement alterations in program. Flexibility would appear to require more efficient and sophisticated communications, and a capacity for handling relevant information about processes and outcomes. Powerful and sophisticated information systems at several levels of organization would underlie the desired move to flexibility.

Finally, flexible and adaptive organizations would contain substantial mechanisms for continuing staff development. Some of this function might be performed as a consequence of the act of developing innovations; the competencies would be engendered by the act of creation. Other aspects of staff development, however, would be formal training efforts built into the normal working day and expected of all instructional personnel.

Rationale: To make full use of the products of a solid science and research establishment, each part of the system would have to know what it is accomplishing, how it is being accomplished, and what is required to come ever closer to desired objectives. Information is seen as the basis, therefore, for flexibility (e.g., knowledge of needs and resources is the first requirement for determining alternative ways of allocating).

Information, however, is not the only prerequisite. Attention would also need to be directed to how institutions for education and instruction can be designed or structured to be able to make use of the information which they would have available. Flexible structures in the absence of information would tend to fall back into the familiar teaching patterns which now prevail. Information alone, however, is not likely to free up the eggcrate school or the lockstep teaching systems which are currently so prevalent. New incentive systems will have to be created and institutionalized as well. The current interest in accountability on the part of parents and the lay public carries the seeds of the new incentives which are likely to be brought to bear.

The reason why schools and colleges in a scientifically-based system are likely to have far different and much more evident staff development responsibilities is closely associated with the amount of continuing innovation such a system would experience. Institutions which constantly change need to prepare their staffs accordingly. Present practices which ostensibly send people elsewhere to receive their training look inefficient for such a system, even assuming that such away-from-school training could somehow be made more effective than it is currently.

Linkage mechanisms. An educational system tied to science and inquiry would almost certainly possess a continuously updated and universally accessible national knowledge bank with capabilities for searching for and retrieving data, research documents, reports of good practice, and the like. Capabilities for producing literature reviews of individual problems, objectives, or policy "targets" would be an important feature of such a system.

Capabilities would be developed to organize, translate, and "package" knowledge and tested practices in forms appropriate to the needs and characteristics of different potential users. Such "packages" might take the operational form of teacher training, demonstrations, interpretive materials, consultation services, and so on.

State and regional information capabilities would appear, facilitating two-way communication of information about educational needs and practices.

New manpower roles and functions associated with adoption and linkage functions would develop and firmly implant themselves as a vital component.

Rationale: Research on change processes in many fields has underscored the importance of linkage mechanisms. These mechanisms provide opportunities for meaningful two-way communication among specialized R&D communities, other knowledge producing mechanisms, and operating agencies for the purpose of diffusing knowledge and installing improved practices.[17] I know of no convincing arguments why the educational system should be exempt from this need and requirement. The application of research to practice is partly a problem of choosing the right kinds of research and partly a problem of devising usable applications through some kind of developmental process. But it is also a problem of making the products of both research and invention available to wider audiences than the immediate inventors. This is equally true whether the inventions are produced in specialized R&D agencies or in operating educational agencies.

Manpower development. A last set of characteristics focuses directly on the mechanisms for training and retraining manpower. Conceptually, there are obvious, indeed, already mentioned interrelationships between manpower development and flexible organizations' research and development capability, and accountability, governance, and assessment procedures.

It would be my guess that a rapidly changing institutional establishment would almost certainly turn away from college and university-based training programs and toward internship, apprenticeship, or on-the-job continuing education techniques for learning new roles and functions. The schools themselves will take on training functions now being performed by colleges and universities.

Existing credentialling mechanisms will give way before performance criteria. In other words, the educational system will come to apply to itself the same kinds of accountability and assessment procedures it will increasingly be asked or caused to accept regarding its performance with its immediate clients. The more this happens, the more likely it is that schools will become the setting for teacher training and accreditation, both preservice and inservice.

Lastly, the training of personnel would itself become the subject of a considerable amount of R&D. The training of professionals and subprofessionals in education would be characterized by much research attention to learning processes and outcomes and staff development techniques.

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[17] Cf. Ronald Havelock, A Comparative Study of the Literature on the Dissemination and Utilization of Scientific Knowledge, ED #029 171

Results would be measured in terms of competencies engendered rather than in terms of courses taken or time spent.

Rationale: Frequent changes in instructional content and processes will require changes in manpower and changes in manpower training. It seems likely that the same forces which will work on the system as a whole would also operate in respect to the development of manpower. More attention will be paid to what is needed in the operating system than to what is thought desirable by the training system. In other words, it seems likely that increased responsiveness of the operating system to clients will be reflected inside the system as well. Just as externally this will lead to new patterns of governance, internally this is likely to lead to quite different arrangements for the training of personnel. The investments that school systems make in the training of personnel will also be likely to lead them to adopt incentive systems for their personnel which will protect the system's training investment in them. This is likely to be a further stimulus for role differentiation and radically revised salary structures.

Summary

This paper presents a market model of educational research and development. The model is based on three assumptions: (a) educational research is a political and social activity, as well as a scientific one; (b) change processes in social systems need to be viewed psychologically and sociologically rather than mechanically, with the conditions for change being seen as more important than the content; and, (c) the political structure of education in this country is, and is likely to remain, decentralized. Oriented to the requirements of policy development and decision-makers, the analysis addresses the importance of identifying and defining client needs first, the availability of delivery systems to serve those needs second, and only then what innovations or knowledge might be required to create something that could be delivered to fill client needs. The market model dissolves the status hierarchies for decision-making implicit in linear models of R&D and substitutes for them transactional processes among equals.

The implications of the market model respecting the definition of "client" were found to focus on the classical distinction between individual and social needs and on the important fact that the consumers of innovations produced for the social services are intermediate to the ultimate clients.

The market model causes research functions to be distinguished in terms of the outputs of activity and who the users of that output are.

The implications for decision structures include the development of procedures to secure much greater involvement of clients in deciding what kinds of R&D should be done and the invention of techniques which better reflect the political character of educational R&D.

Adoption of the market model would lead to greater decentralization in the development of institutional capabilities for educational research and development. This would take the form of creating new specialized R&D institutions, like the educational laboratories and the inculcation of a rich array of research activities in operating educational agencies--schools, colleges, universities, State educational agencies, even (particularly?) the U.S. Office of Education--designed to inform key decision-makers of many kinds about the adequacy of and progress toward stated objectives.

The implied needs for manpower development point squarely to training far greater numbers in development, operations research, and evaluation. The model also suggests the importance of devising ways to better acquaint R&D personnel of the requirements associated with different kinds of markets.

A concluding section of the paper identifies one vision of the general goal behind the integration of systematic inquiry and education and suggests what might characterize governance, research capabilities, organizational structures, linkage mechanisms, and manpower development if the goal were to be achieved.

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A CRITIQUE OF THE PAPER

David L. Clark

Indiana University

The central thrust of a paper which purports to critique a particular framework for viewing educational research, development, diffusion, and evaluation should be upon the question of whether the framework, or the vantage point provided by the framework, illuminates one's view of the phenomenon being observed. Unfortunately, in terms of simplicity, the author has adopted a broad perspective within which to explicate his framework and it is impossible to ignore that context in reviewing his efforts. This contextual critique is made necessary by the author's insistence on the interdependence and interrelationship of his arguments. At the risk, then, of obfuscating the central idea to be critiqued, I shall begin at the beginning and proceed sequentially to respond to, "A Market Model."

A Solution in Search of a Problem

The author is convinced that educational research and development is in "a muddle." The difficulty with this muddle is that it is hard to define--no doubt that is characteristic of muddles as contrasted with problems. However, according to the author, the muddle does have certain operational features, to wit:

- The field of educational research has been in a state of political disarray (p. 13).
- The management and administration of educational research at the Federal level has been in need of upgrading and reorganizing (p. 13).
- The various constituencies of research in education have been hyperexcited, skeptical, horrified, hopeful, confused, and groggy (p. 13).

The proposed solution to the muddle is twofold; first, to turn upside down the ". . . basically linear and hierarchical notions about how research and development can improve educational practice" (p. 13); and, consequently, second to ". . . develop a highly sophisticated, imaginative, and unyielding concern for the market being served or created by educational R&D" (p. 14).

Even if one were to accept the chain of argument set forth by the author in this first section of the paper, and the operational characteristics of the muddle the field is in, his conclusions strike this reader as overdrawn and indefensible. The problems, you will recall, are political disarray, ineffective Federal management, and a bewildered constituency. The cause is argued by the author to be the acceptance, and use for planning purposes, of an inadequate and unsophisticated framework for viewing educational R&D--the so-called linear and hierarchical notion.

To infer the cause to be a single conceptual framework, however inadequate or misapplied, seems to be an unlikely hypothesis. A much more straightforward, plausible alternate hypothesis to account for the problems would be, for example, the existence of muddle-headed planner; or, efforts to milk political propaganda advantage from glossy but underfunded programs; or, impatience with well conceived programs that never had a chance to mature and become productive. Interestingly, the author cites exactly these alternate hypotheses as he proceeds through the paper and refers to (a) ignorance of planners and policy-makers (p. 15), (b) underfunding of social science research (p. 16), and (c) impatience with the Regional Educational Laboratory Program (p. 31).

The point to be made is not that one or a combination of the foregoing three examples caused the "muddle," but that any one of them is a reasonable explanation with as much or more logical support than the reason cited by the author.

The loosely-stated problem and the unlikely solution do give rise to difficulties which are not wholly self-contained in the introductory section. The author is much disturbed by the apparently widespread acceptance of an othodoxy, the R-D-D-A taxonomy. Many of the criticisms he directs toward this limited view of educational R&D and the misapplication of the vantage point provided by that view (as if it were linear and hierarchical) are well taken and will be commented upon in more detail later in this paper. However, the conclusion that the substitution of a new orthodoxy, the market model, will lead educational research from its present muddled state to a productive, visionary future misses the whole point of creating and using multiple vantage points to make better decisions about research and development in education. Whether the R-D-D-A taxonomy is turned on its head, its tail, or sideways, it will still represent a highly limited view of the world of educational R&D which, although it may have heuristic value, will neither be a sufficient basis for planning or decision-making nor a solution to the "muddle."

Modeling with Feet of Clay

Most readers who have had experience with the process of model construction and use in the social and behavioral sciences will have difficulty with the peculiar use of the term in this paper. It would be convenient to dismiss this problem as nothing more than a pedantic question about the use of terms. However, the author is quite serious about his use of the term modeling and contends that the "market model" is derived from, and based upon, assumptions generated by the modeling process.

The author is right on target when he notes that the process of modeling is designed to increase understanding of a process about which less is known than one would wish to know. To achieve this better understanding one may turn to a system which is better understood and which can be defended as isomorphic to the system one wishes to understand. Isomorphism indicates that the system to be modeled resembles the alternate system in form rather than content. The system to be modeled in this case is economic in origin and is noted simply as "the market." In fact, the system which serves as the model is explicated on pages 19-21 and is based upon one reference in the field of economics which discusses the characteristics of growth industries. No effort is made to argue convincingly that the original model has either feature required of models, i.e.,:

1. That the system used as a model is understood with significantly greater clarity than the alternate system under study.

2. That the system used as a model is, in fact, isomorphic to the alternate system.

Such objections are neither trivial nor pedantic. If the reader is not in a position to be able to identify the elements of the systems under consideration, he can hardly assume that relationships held between two elements in one system will hold for similar elements in the second system. Yet the author persistently employs this type of argument to support his point of view.

Modeling is not a self-evidently useful process. As Abraham Kaplan points out, where a model is possible but not useful because of the crude state of knowledge in a field, modeling may:

(a) impose premature closure on ideas; and,

(b) lead to oversimplification or undercomplication.[1]

The reader should, in my opinion, abandon the notion that he is dealing with a model in any usual scientific sense of that term. This is not at all equivalent to saying that the reader should ignore what the author has to say in subsequent sections of the paper. I am concerned only that the author's ideas be examined on their own merits and that his arguments be considered aside from the analogies which he too often purports are derived by modeling. It is possible to consider, apart from the question of the method of derivation, the matter of whether he has established a vantage point from which can be obtained a clear view of educational R&D.

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[1] Kaplan, Abraham. The Conduct of Inquiry. San Francisco, California, Chandler Publishing Company, 1964, pp. 279-280.

Examining the Assumptions

If the reader accepts the notion of abandoning the modeling thrust underlying the paper, he will have to test the basic assumptions with great care since they now form the thrust of the author's argument. The first assumption is that ". . . science as it is practiced and managed in support of education is as much a social and political activity as it is a scientific one" (p.18). I am unimpressed by the labored argument used by the author to arrive at this conclusion (the interactive effects of investigators and variables in physical as contrasted with behavioral science studies), but I agree, none-the-less, with the conclusion. The simpler argument in support of the point is that the empirical evidence of research and development support in education over the past 15 years demonstrates the assumption as a truism. From the first appropriation in USOE for P.L. 531 in 1956 with its overwhelming emphasis on research on the mentally retarded, through the support for the National Science Foundation's Course Content Improvement Program in the wake of Sputnik, to the most recent proposal for a relatively inexpensive but highly visible National Institute of Education, I think the impact of chiefly social and political considerations on Federal level planning or "scheming" about educational R&D is evident. The author's more involved argument is necessary, from his point of view, since he does not agree that past decision-making at the Federal level serves as empirical evidence of his assumption. He feels that such planning has not taken into account adequately the social and political character of science in education. By different routes, then, we have arrived at an identical assumption from which we will draw different conclusions.

The significance of this assumption, once established, varies depending upon one's concern for using a framework for educational research, development, diffusion, and evaluation for Federal level planning purposes. The development of perspectives for viewing educational R&D, or efforts to reconstruct logically the processes of research, development, diffusion, and application in education--or any social process field--may be undertaken for a number of reasons. One might, for example, be concerned chiefly with a framework which assists in distinguishing among behavioral objectives for trainees in R, D, D, and A training programs. This author is concerned solely with the development of a framework useful for Federal planning in educational R&D. All frameworks or vantage points are not equally useful for all purposes. In the context of the author's concern, the assumption regarding the social and political character of scientific activity in education is vital. As a matter of fact, in view of the author's central purpose for devising a model to assist in Federal level planning it is nearly a self-fulfilling prophecy.

The second assumption is less easy to accept at face value. Many researchers will argue with the statement of the "purpose of science" which the author states on page 19, i.e., "to develop understandings or knowledge which hopefully can be applied in some fashion or another to achieve desired human ends." The author himself alters this definition on page 28 by noting that, "The purpose of research or science is the production of verifiable knowledge." He has, by that time, distinguished between science and technology and notes that the purpose of ". . . technology is the creation of capabilities to perform specified functions or achieve specified outcomes where that capability did not exist before" (p. 28).

Let us assume then, that the author meant to encompass technology in his earlier discussion of the change process in social systems. The central thrust of the second assumption is that ". . . the conditions which create a readiness in a social field to accept an idea from science are more important as far as adoption is concerned that the idea itself" or, ". . . in social domains the 'whose time has come' part of the phrase is far more important than the 'idea'" (p. 19).

This line of argument is difficult to follow. The author seems to be implying that ideas do, in fact, have a life of their own apart from their power as ideas or their relationship to science (and, perhaps, to technology). He cites as examples to support this contention, first, the nonadoption of strong ideas and second, "faddism" or the adoption of low-power innovations. I would contend, as I did earlier in the case of the explanation of the "muddle" in which educational R&D finds itself, that the author has overlooked more cogent explanations for the phenomenon he is examining. Surely it is true that education has been characterized by faddism. It is equally true that apparently strong ideas have, in many cases, not been implemented. However, the dangerously low level of technology or development in the field would seem to be a more likely and a more direct explanation than the somewhat mystical notion that ideas exist on their own in the educational ethos. Educators, it could be argued, are fad prone because well engineered solutions to their operational problems are not generally available. Many low-power ideas are quickly diffused simply because they are uncomplicated to apply. Many more powerful notions seem to die aborning because they are inadequately engineered.

This paper has neither the time nor space to develop the foregoing argument completely. The only point to be made is that, again, a plausible, alternate hypothesis exists which is as well documented as the explanation set forth by the author.

It is critical to note that contrary to the author's contention on page 19, the point in regard to the second assumption is not "simple." The assumption supported by the point, however, is critical to the acceptance of the author's model, that is, ". . . the conditions causing practitioners and policy-makers to attend to the ideas emerging from science must be established parallel to and as part of the support of science itself" (p. 19). If the support of educational science and technology were at a level where well engineered solutions to operational problems in schools were available to practitioners in profusion, one might have an empirical test of the author's contentions. I think it is reasonable to argue at this stage in the development of educational R&D that the change strategy implied in the second assumption, noted immediately above in the quotation from page 19, may very well not be a necessary component at all; in fact, it could impede rather than facilitate the emergence of ideas "whose time has come."

In regard to the author's third assumption, I would debate neither the rationale supporting the conclusion nor the conclusion that educational decision-making respecting instruction and curriculum will continue to be decentralized. The current interest in the administrative organization of schools in England and the apparent trend toward further alternatives for education in this country can be added to the arguments already cited by the author to support his third assumption.

The Heart of the Matter

The message of the "market model" is stated in direct fashion on page 21:

> "Educational research and development must be conceived in terms of the market, consumers, and clients it is supposed to serve. Only after that principle is firmly established should attention be directed to the processes, techniques, and functions which might accomplish that service."

This statement of principle is introduced by the author with an equally unequivocal comment. "From the basic assumptions and other considerations developed above . . . . I am led to one compelling conviction" (p. 1).

The only summary statement I can offer in response is: "I am sorry he feels that way." From my previous comments it must be obvious that I do not believe that a compelling argument has been built to lead the reader to the same conviction as that held by the author. That is enough to justify disagreement with the author but I am not just disagreeing--I am lamenting the stated strength of the author's position. I feel it is lamentable because there is the germ of a very useful concept in this paper, but the strength of the rhetoric tends to obfuscate the concept.

The author insists on making his point by drawing unfavorable comparisons between the so-called "market model" and a previous effort to view educational R&D by classifying functions across process areas from research through application. This combative tendency has caused a substantial loss in intellectual energy. The straw man being constructed for destruction by the author is hardly a "bogeyman" at all.

Perhaps the reader will be assisted in understanding the apparent connection between the two frameworks with a brief historical note. Some eight years ago this author, along with Dr. Egon Guba, attempted to construct a taxonomy of the processes related to and necessary for change in education. This effort, based primarily on sociological research on the diffusion process in agriculture and medicine, was published formally for the first time in 1967.[2] The original taxonomy had as its purpose the establishment of an agreed upon set of terms, definitions, and objectives which could be used to describe the processes necessary to--but note, not sufficient for--change in education. The author points out, I think correctly, that this definitional scheme is an inadequate base upon which to rest planning for educational R&D. He goes on to point out, also correctly in my opinion, that the vantage point is not only restricted but basically nonsequential and nonhierarchical. This is true and was so noted by the original authors. This notation was made explicit to warn readers away from applications of the schema which would have been inappropriate. It does not, for example, identify the genesis of ideas as being researchers rather than practitioners; as a matter of fact, it does not speak to that issue because that was beyond its purview. The author notes, and this may also be correct, that the definitions have been stretched beyond any reasonable limits as a basis for Federal level planning.

The next step in the author's chain of argument is one to which serious objection can be raised. Having noted the inadequacy of any model, or in this case a classification schema, to take into account or to properly account for all the variables associated with a phenomenon leads neither to (a) abandonment of the original vantage point, nor (b) imperative acceptance of an alternative conceptual structure. Knowledge about the change process in education has not reached a point where "principles" have emerged or should be established; or, where any conception "must" be adopted. This is, as was noted earlier, one of the persistent dangers in modeling, i.e., the establishment of premature closure on thinking about a phenomenon.

The reader can, and I would suggest should, ignore the author's statement of imperatives and proceed through the remainder of this section as if the author had introduced a new concept for his consideration. Pretend that the author has suggested consideration of how educational R&D might be viewed if the client to be served were considered as the heart of the matter; and, if all processes, techniques, and functions were organized and carried out to the end that the client is able to deal effectively and efficiently with the operational problems of education. This is the "big idea" underlying this paper and an interesting and useful concept for further consideration.

Acting "As If"

The author's "conceptual turnabout" is a mixed bag. I suggest that the reader ignore the first half of the section (pp. 21-22) and pay close attention to the second half (pp. 21-23). The first part of this section is a weak example of modeling. Without reiterating the criticisms stated earlier in this paper, note only that the single reference employed deals with a system probably not isomorphic to the field of education and results in the bad example on pages 21-23 where the service to clients is defined as success within the system which is supposed to be servicing clients.

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[2] National Education Association Center for the Study of Instruction, Rational Planning in Curriculum and Instruction, NEA, Washington, D.C. 1967, pp. 111-133.

Ignoring the model, however, the reader can pick up on an interesting and fruitful "as if" game initiated by the author on page 23. He suggests taking the R-D-D-A "models" (i.e., taxonomies) and creating an explicit hierarchy to substitute for what he feels has been an implicit hierarchy. This is his conceptual turnabout and surely does imply a new pattern of transaction in educational R&D as well as new ways to consider organizing the field.

One caveat is worth entering at this point. The author notes on page 23 that current R&D programs have, in his opinion, been directed toward the R&D community as a market rather than toward operating educational sites. Most residents of the R&D community will have difficulty in swallowing that view. Little has been expended by USOE on research training. Individual researchers in all settings are complaining bitterly that Federal funds to support their efforts are not available, and have not been for at least the past three years. Interest in science or research, as contrasted with technology or development, seems to have been on the decline since the mid-sixties. The reader should be aware of the fact that researchers, in general, might well contend that the R-D-D-A classification schema, if it ever was used seriously for Federal planning, has not resulted in a situation which they would feel caters to the R&D community. The point might better be made that Federal planning and decision-making has considered no market, rather than having favored an inappropriate market.

The most useful observation the author has to offer prior to the delineation of the "model" is encompassed in one sentence on page 23 when he restates his notion of a transactional process among equals (i.e., clients, practitioners, and R&D performers) in resolving conceptual problems related to Federal, state, and local planning for educational R&D.

The "Model"

This is a very difficult section to critique since, in the normal usage of the term model, the "model" is missing. Figure 2 in a diagrammatic representation of the market model which, predictably considering the techniques of modeling employed turns out not to be a model. The operational consequence of employing the conceptual turnabout turns out to be the notation that all settings are involved, to some extent, in all the processes defined in the R, D, D, A taxonomy. As the author demonstrates on page 34 and following, this is to some extent true, but the examples provided illustrate equally well that the emphases on the processes vary sharply and that specialization in function is a natural consequence of maintaining differential institutional settings.

Let me try, as fairly as I can, to note and comment upon the points the author cites on pages 34-39 as the heuristics of his model:

> "Earlier attempts to define what was and was not research were basically exclusionary in their purpose. The idea was to figure out what to eliminate from view as unworthy or inappropriate. . . . The emphasis (in this paper) is on transactional equality rather than status, on inclusion rather than exclusion, on the empirical rather than the logical" (p. 37).

There can be no counter argument to the point that definitions are basically exclusionary in character. If one attempts to use a word to mean something, then it cannot mean everything. The author discovered this to be true and, consequently, used pages 28-30 to define research as contrasted with development so that his readers would understand what he was excluding, and including, when he referred to research. The earlier efforts to define R-D-D-A were directed to broadening rather than limiting the definition of processes related to educational R&D. They succeeded, as a matter of fact, in focusing attention on such fields as development and evaluation rather than diminishing them or depicting them as unworthy. This conclusion by the author is a poorly stated derivative of the "model" and is one which tends to confuse the reader.

> "Policies respecting institutional development of research for education would reflect the decentralized nature of decision-making in educational practice" (p. 37).

As the author rightly points out, the Federal level decision-making regarding educational R&D has tended to rely on input from the producer rather than the consumer and has tended to assume a paternalistic attitude toward both, i.e., emphasizing the funder rather than either the producer or consumer. Personally, I am sympathetic toward the point he is driving home on pages 37-38, but I find it hard to relate this point to the model. The argument supporting decentralized decision-making was one of the author's basic assumptions and the section presented here could have been written and supported equally well with no reference to the "model."

> "One of the strongest needs that the market model suggests ought to be served is the cultivation of research techniques associated with the identification and definition of operational need" (p. 38).

It is true that educational R&D has a remarkably ineffective system of context evaluation. Perhaps the market model would give emphasis to this deficiency.

> Another ". . . thrust would be the deliberate attempt to stimulate the creation of autonomous institutions, scattered across the country, designed to undertake and carry out their own self-defined research and development activities in support of education" (p. 38).

How this conclusion is supported by the model I do not know. Since there are extant settings and they have, according to the author, roles to play in bridging R, D, D, and A, this reference seems anomalous. One would guess that the market model would encourage activity closest to the point of effective action, i.e., schools and school systems, rather than the creation of other autonomous institutions serving as intermediate agencies.

> ". . . the continual searching out of alternative ways of cultivating research capabilities" (p. 38).

This would appear to be an affective rather than a cognitive problem which, hopefully, might be derived from any model proposed to view educational R&D.

> ". . . greater efforts need to be directed (first) to the training of people to carry out the research responsiblities of operating educational institutions and agencies . . . " (p. 39).

A good point and one to which the concept of consumer orientation is relevant. The ineffective efforts of USOE to involve public school personnel significantly in their Title IV training effort substantiates the author's point of view that the planners did not view R, D, D, and A training in operational agencies as a high priority concern.

> ". . . to developing much finer sensitivities of the many different contexts within which personnel trained to carry out R&D responsibilities can expect to find themselves" (p. 39).

A good point similar to the one made above. Most persons, even those who would advocate dissimilar models, would support this recommendation.

An Evaluation of The "Model"

The model is not a model at all, but instead a single concept. The model, as such, does not simplify or make more clear the view of educational R&D. It is primarily a suggestion to reorient one's thinking to a view of the client (ambiguously defined) as the focal point from which to project an as yet undefined model of educational R&D. The author is still functioning chiefly at an exhortative level in the area in which he is working. He is disturbed, and I believe rightly so that many others concerned with the same area fail to account properly for the client in their efforts to construct taxonomies or models. Realistically, however, he will have to inject an alternative schema with more heuristic value than his present effort, if he expects to compete on even terms for the attention of practitioners, researchers, and Federal planners.

Some Random Observations

The author strokes with a broad brush and, although much of the material included on pages 27-34 is not imperative to an understanding or critical analysis of his model, he makes it difficult for a critiquer to leave unchallenged some of his more general observations on educational R&D.

1. Poker chips. The discussion of USOE's poker chip game tells the reader much more about inept planning than it does about the use of taxonomies in the process of planning. A group of planners should not have had to "discover" that planning could not proceed without an explication of problems, goals, and objectives. It seems equally strange to "discover" that taxonomies are not particularly useful conceptual models. One might reverse that procedure and discover that conceptual models are not very useful taxonomies.

The author unintentionally misleads the reader in this section. A taxonomy is employed as a straw man to justify the substitution of an alternative which needs no justification of this sort. The pressing utility of both definitions and taxonomies is immediately made apparent by the author himself on pp. 27-28 as he proceeds to define the terms which he will employ in his own efforts to construct a model.

2. Chicken or egg. The author notes that, "The model clearly stresses system or client need over R&D process capability" (p. 31). This may well be more a phasing problem than a conceptual distinction that makes a difference. If a system has no capability, e.g., no trained personnel in R, D, D, A, it may be necessary to emphasize the creation of some level of capability before client need can be employed for further decision-making. The danger is freezing-in some inappropriate R&D capability so that subsequent decision-making is based on faulty *a priori* decisions. This very problem arose in the early stages of the USOE's research training program where the press for immediate action caused reinforcement of the extant college-based, educational psychology-oriented, training programs at the expense of a broader view of the need for trained personnel. This early decision-making then became frozen when additional funding for the program, which had been anticipated, failed to materialize.

A balanced view of R&D capabilities and client need might be a more reasonable approach than either considered alone or even predominately.

3. The common touch. The author is on very popular ground when he contends that ". . . in the choice of ends we have no greater or lesser status than any other human beings" (p. 31). Or, "The marketplace in education is a political marketplace" (p. 31). Although I would join with him in insisting that (a) the political dimensions of the educational marketplace have been ignored too often, especially by educational researchers ; and, that (b) broader access to decision-makings structures at the Federal level would be desirable, I think he has become platitudinous in his approach to the problem. Educational R&D does operate in a political marketplace, but it also

has a significant intellectual content derived from an informed scientific community. As the author himself points out, it is possible and desirable to gather systematic data on the context of operations in education and make this available to decision-makers at all levels. Joint recognition of roles in decision-making relating to educational R&D might be more helpful at this stage than attempting to redress a previous imbalance by creating a new one.

Education--A Vision

No particular end would be served in this critique by commenting extensively upon the author's vision of the future. For the most part, I am, and suspect the reader will be, in sympathy with the points made on pages 40-46. The question is whether the model has generated the vision or whether the application of the model would facilitate the attainment of the vision. Personally, I think neither is the case. Education and science have not "put it together." There are many reasons why they have not. I think few of them are apparent in this document on the market model.

RESPONSE TO THE CRITIQUE

Hendrik D. Gideonse

It is disconcerting for a writer to discover that a piece of his work has failed almost totally to communicate what he had intended. I thought I was writing about the forests we needed; Dean Clark found only the trees that we have!

The only reasonable explanation is that the fault lies somewhere in my paper. A constructive response, therefore, is to try to restate the case I thought I was making as simply and concisely as I know how, but this time in a way which responds to the critique that has been rendered.

Let me start out with an admission of one clear insufficiency in my paper. I should have stated the problem I was attempting to solve as explicitly as I stated the assumptions underlying the attempt. So let me state it now. The problem is the marginal effectiveness of educational R&D relative to its mission, a situation closely related to our inability to secure resources on a scale sufficient to the task involved. The "political disarray, ineffective Federal management, and a bewildered constituency" Dean Clark claims I identify as the problem are, or course, merely symptoms of the deeper malaise.

The paper I drafted was an attempt to develop a *prescriptive* model oriented toward the production of a desired *future* state of affairs. The model was designed not for scientists, but for policy-/and decision-makers bearing responsibility for educational R&D. It was designed to be used as a conceptual underpinning to help (*a*) build a more effective R&D system for education, (*b*) build a larger and more effective constituency for educational R&D, (*c*) increase desperately needed political support, (*d*) build to a scale of effort which would render decision-making about goals and objectives greatly more meaningful than it now is, and (*e*) have, as a consequence of all the above, a substantial, continuing, and beneficial impact on the practice of education in this Nation.

I italicize the words "prescriptive" and "future" to underscore the fundamentally different perception between what I was trying to do and what Dean Clark thinks I did. His criticism of my attempt at modeling has basically two related parts: (*a*) it does not help us better understand the empirical phenomena to be found in educational R&D; and, (*b*) it is insufficiently isomorphic to the reality it purports to describe.

As I hope I have now made clear, the market model does not claim to describe present reality. Rather, it attempts to prescribe how we must conceive of educational R&D *if the present reality is to be significantly altered in desired directions*. At the risk of incurring a new charge of using an inaccurate analogy, the point I am making here is like the idea that all the modeling in the world of the existing rail and highway transportation systems is not going to lead to the design of transportation systems which involve airplanes for speed or pipelines for the transport of bulk commodities. I agree that inappropriate modeling can impose premature closure or lead to oversimplification or undercomplication. None of those negative consequences, however, can be determined except retrospectively. If we are permitted to model only for purposes of understanding better the empirical, then we are condemned to cover the windshield and drive down the road using only the rear view mirror!

As to the problem of isomorphism, it strikes me that the economic system is better understood than the educational, and that the theories and systems used there are far more powerful in terms of their predictablity or manipulability than anything we have so far devised in education. It is therefore not only legitimate but instructive to employ the analogy and to follow through on the implications of its possible application to educational R&D. In any case, it is both proper[1] and elegant to design a model by considering the function of the system being modeled (in this case, serving the education market) or what that system is supposed to be accomplishing, i.e., its mission, aim, or purpose.

Having responded to Dean Clark's principal objections, I use the remainder of the space available to me to restate my argument in simplified form. First, the basic assumptions and beliefs which underlie the model.

My desire to explicate as fully as I could the foundations of my attempt at system design was itself a reflection of the idea that, in the social domain, belief is oftentimes as important as knowledge, and ideas can come true as a consequence of believing and building on them.

Simply stated, my basic assumptions were:

1. Educational research is inextricably bound up in questions of value and is therefore as much a political activity (in the generic sense of that term) as it is a scientific one.

2. Change in social systems is psychological, social, or political. It is not primarily logical. It depends on the power of the proposed change.

3. The administrative structure of education is decentralized and pluralistic.

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[1] Cf. Gerald Nadler, "A Universal Approach to Complex System Design," in The Engineering Manager: Survival in the Seventies, 17th Joint Engineering Management Conference, Montreal, Canada, 9-10 October, 1969, p. 126 and his "Systems Engineering and Concern for People: Compatible or Contradictory," in Technical Papers, AIIE National Conference, 14-16 May, 1969, Houston, Texas, p. 287.

On the basis of these assumptions and the experience acquired over the past six and one-half years participating in the management of USOE's research programs, studying educational R&D, and participating in policy reviews (particularly the OECD-sponsored one), I then developed a conceptualization of educational research based on its function of serving the educational market. This conceptualization was stimulated by a paper written by Theodore Levitt in which he explored the mechanisms by which major corporations grew and prospered. His conclusion was that corporations maintained their growth position as a consequence of attending to markets rather than to products. Levitt concluded that successful industry, beginning with a customer and his needs, first determines whether there is a mechanism for delivering satisfaction, then asks what kind of a product needs to be delivered to achieve that satisfaction, and finally determines what and whether the raw materials (including the knowledge of technical processes, etc.) are available to create the product.

Whether or not the system--in this case, economic--which spurred my thinking was isomorphic to educational R&D is finally irrelevant. What is important is the suggestion that we have been spending too much of our time looking at secondary propositions (how to characterize and identify R&D functions and their relationship to one another) instead of primary ones (what it was that needed improving, why, and who the ultimate beneficiaries of that improvement might be).

Once the preoccupation with the processes and characteristics of educational research is dropped, it suddenly becomes possible to see a whole host of things that were not immediately apparent before.

One of these realizations is that all educational institutions perform certain kinds of R&D functions. Of course, what is research for one may not be research for another, and the same thing can be said for development. That all institutions perform or ought to perform activities which they can legitimately call research or development is an idea that has gotten lost in academic arguments, e.g., whether evaluation is really research, or applied research really prototype development, and so on.

The focus on the market also reinforces our understanding of the importance of what I called transactional processes among scientists, academicians, practitioners, and linkers of one kind or another. This bodes well for more effective communication among these many participants, a goal which has often been addressed by educational R&D performers and managers, but about which we have not been terribly successful.

A third idea which the market notion reinforces is that decision structures for educational R&D should be much more responsive to the essential political dimensions of the R&D undertaken. This concern emerged directly from the basic assumptions; but, it was also a consequence of the market's being a decentralized one, and one that is characterized by a great deal of diversity.

Finally, the market conception suggests that much more needs to be done to build the research capacities of operating educational agencies. These lie primarily in the evaluation area. The principal reason for this conclusion was the need to create a more sophisticated market for defining and acquiring R&D products of different kinds.

All of the implications identified here (there are others and they can be found in the body of the paper in the third section) are of course policy implications. They are not hypotheses which lead to a deeper understanding of what educational R&D now is, but hypotheses about what educational R&D must become if it is to be more effective than it now is.

Finally, a remark or two about tone. Of course it was exhortative! My purpose was to persuade people of the value of this conception. I would go further, however. I would say that one of our great insufficiencies is informed passion; education, in its self-consciousness, tends to stuffiness, dissection, and dismembering analysis. What we need is a little more humor, a little more feeling, and a lot more responsible zeal!

CHAPTER 2

EDUCATIONAL INQUIRY AND THE PRACTICE OF EDUCATION

AUTHORS: Gene V Glass
Professor, Laboratory of Educational Research
University of Colorado

and

Blaine R. Worthen
Co-Director, Laboratory of Educational Research
University of Colorado

CRITIQUER: Paul D. Hood
Director, Communications Program
Far West Laboratory for Educational Research
and Development

SYNOPSIS

The Glass-Worthen paper analyzes the nature of educational RDD&E in relation to the concept of "disciplined inquiry." Within that framework educational research and evaluation are seen as having the characteristics of disciplined inquiry activities, educational development having only a few of those characteristics, and educational diffusion having none of them. As viewed by Glass and Worthen, educational development and diffusion are best considered "inquiry related" activities. Following that analysis the paper focuses in detail upon the nature of and similarities and differences between educational research and evaluation.

Disciplined inquiry is portrayed in the paper as a domain with three intersecting sub-divisions: historical, philosophical, and empirical. Educational research and evaluation are differently distributed within each; educational development links only to the empirical; and diffusion is shown as standing outside all three. Research and evaluation are distinguished on the basis of both fundamental properties and strategy of implementation; development is distinguished from research and evaluation by its reliance upon invention and engineering; and diffusion is distinguished from all of the above by its identification with the change process (dissemination, demonstration, facilitation of adoption) rather than the inquiry process.

The paper contains recommendations for change in relation to the conduct of inquiry-based activities, and a proposal to involve the private sector in a way that would increase the impact of development and diffusion activities on the practice of education.

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EDUCATIONAL INQUIRY AND THE PRACTICE OF EDUCATION[1]

Gene V Glass and Blaine R. Worthen

Laboratory of Educational Research
University of Colorado

Our intent is to examine the nature of four inquiry and inquiry-related activities in education: research, evaluation, development and diffusion. The relationships among these activities are investigated and some proposals for their implementation are presented. The paper is organized into six major sections: (*a*) a consideration of the inquiry process and its components; (*b*) the relationship of research to evaluation; (*c*) the relationship of development to research and evaluation; (*d*) the relationship of diffusion to other inquiry-related activities; (*e*) proposals for a more useful implementation of educational research, evaluation, development, and diffusion; and, (*f*) a concluding statement. The first four sections are interdependent. The reader who has wearied of the tedium of classifications and reclassifications of research, evaluation, development, and diffusion can skip to "Proposals for a more useful implementation. . ." which stands alone.

Components of the Inquiry Process

Research, development, diffusion, and evaluation have been identified as classes of activities that collectively represent the spectrum of inquiry and inquiry-related processes in education (e.g., Clark and Guba, 1965; Bureau of Research, USOE, 1969; Worthen and Gagne, 1969). This conception has also been at least partially verified by empirical assessment of functions performed in institutions in which inquiry and inquiry-related activities are conducted (Sanders and Worthen, 1970). An attempt is made in this section to define and interrelate these four classes of activities to provide a perspective for the analyses and recommendations in the remainder of the paper.

Definitions

Simple, verbal definitions of research, evaluation, development or diffusion are never fully satisfactory. Many recent attempts to define these activities treat them as Platonic ideals which would permit simple Aristotlian definitions if the definer were only perceptive enough. These inquiry and inquiry-related activities are far too complex to be defined adequately as a classicist might have given an acceptable one-line definition of a tree. Research, development, diffusion, and evaluation are complicated endeavors. They are ultimately no more than hypothetical constructs for a disposition of persons to respond with a certain word in the presence of certain instances of the production or utilization of knowledge. The meaning of the words can be seen by examining characteristics of the phenomena which elicit from scholars the terms research, evaluation, development, or diffusion in their writing, their conversation, and their private thoughts.

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[1] An earlier draft of this paper appeared under the title, "Interrelationships Among Research and Research-related Roles in Education: A Conceptual Framework" and was distributed in the AERA Task Force on Research Training Technical Paper series. However, both drafts of this paper have been prepared under support of U.S. Office of Education Grant OEG-0-70-4977.

Attempts must be made to differentiate research and research-related activities at an abstract, verbal level. It has been argued elsewhere that attempting to define and distinguish research and evaluation is not mere idleness; confusion of the two accounts for much wasted motion in educational scholarship (Glass, 1967). Similarly, failure to recognize differences among other inquiry-related activities complicates the already difficult job of the would-be trainer of inquiry and inquiry-related personnel in education. In the sections that follow, attempts are made to differentiate among these terms, using not only verbal definitions, but also the specification of characteristics that serve to distinguish one inquiry-related activity from another.

In spite of the shortcomings of simple, verbal definitions of research, development, diffusion, and evaluation, such definitions can serve as a point of departure. The simple definitions that follow will be elaborated and defined more fully through the discussion of each inquiry-related activity.

1. Research is the activity aimed at obtaining generalizable knowledge by contriving and testing claims about relationships among variables or describing generalizable phenomena.[2] This knowledge, which may result in theoretical models, functional relationships, or descriptions, may be obtained by empirical or other systematic methods and may or may not have immediate application.

2. Evaluation is the determination of the worth of a thing. It includes obtaining information to judge the worth of an educational program, product, or procedure, or the potential utility of alternative approaches designed to attain specified objectives. According to Scriven (1967):

> "The activity consists simply in gathering and combining of performance data with a weighted set of goal scales to yield either comparative or numerical ratings; and in the justification of (a) the data-gathering instruments, (b) the weightings, and (c) the selection of goals" [p. 40].

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[2] Apologies to mathematics, history, philosophy, etc., for the obvious empirical social-science bias in our definition and our thinking. We attempt to deal more with historical and philosophical research in the later section on disciplined inquiry in education.

3. Development (in education) is the production and testing of curriculum materials (including books, films, computer-assisted instruction programs, etc.), organizational or staffing plans (e.g., team teaching, differentiated staffing, modular scheduling), and other applied media or instruments of schooling.[3]

4. Diffusion encompasses planning, designing, and conducting activities leading to the application of the knowledge and products of research and development. This may be done by various means, including (a) the use of communication techniques to disseminate information about the knowledge or product, (b) the conduct of demonstrations to establish the utility and applicability of the product or knowledge, and (c) procedures which facilitate adoption or application of the product or knowledge.

Disciplined Inquiry in Education

Cronbach and Suppes (1969) defined disciplined inquiry in education as follows:

> "Disciplined inquiry has a quality that distinguishes it from other sources of opinion and belief. The disciplined inquiry is conducted and reported in such a way that the argument can be painstakingly examined. The report does not depend for its appeal on the eloquence of the writer or on any surface plausibility. The argument is not justified by anecdotes or casually assembled fragments of evidence. Scholars in each field have developed traditional questions that serve as touchstones to separate sound argument from incomplete or questionable argument. Among other things, the mathematician asks about axioms, the historian about the authenticity of documents, the experimental scientist about verifiability of observations. Whatever the character of a study, if it is disciplined, the investigator has anticipated the traditional questions that are pertinent. He institutes controls at each step of information collection and reasoning to avoid the sources of error to which these questions refer. If the errors cannot be eliminated, he takes them into account by discussing the margin for error in his conclusions. Thus the report of a disciplined inquiry has a texture that displays the raw materials entering the argument and the logical processes by which they were compressed and rearranged to make the conclusion credible. . .

---

[3] By not defining development as the utilization of results from research or evaluation, we have intentionally not prejudiced a later discussion of the relationships among research, development, and evaluation.

> Disciplined inquiry does not necessarily follow well-established formal procedures. Some of the most excellent inquiry is free-ranging and speculative in its initial stages, trying what might seem to be bizarre combinations of ideas and procedures, or restlessly casting about for ideas . . .But. . .fundamental to disciplined inquiry is its central attitude, which places a premium on objectivity and evidential test" [pp. 15-16, 18].

Inquiry, thus defined, is much more encompassing than the four activities of concern here--research, evaluation, development, and diffusion--and includes at least three somewhat different types of inquiry: empirical inquiry, historical inquiry, and philosophical inquiry. Interrelationships showing commonalities and differences among these types of inquiry and their components might fruitfully be portrayed graphically. Figure 1 is an attempt to depict the domain of educational research and research-related activities. The field upon which the diagram in Figure 1 is imposed represents language usage (as much as anything else). An element in the field is an instance of an inquiry activity being named by scholars either "empirical inquiry," "historical inquiry," or "philosophical inquiry." The sizes of the circles are approximately indicative of the relative frequency of the occurrence of the associated terms in intelligent discourse about educational inquiry.

The interrelationships shown in Figure 1 are obvious. The shaded portion is a recognition of other unspecified types of inquiry not included under the rubrics "empirical," "historical," and "philosophical." The discussion in the following sections is an elaboration of this figure and represents the authors' conception of a way of depicting, verbally and graphically, inquiry and inquiry-related activities in education.

Empirical inquiry can be thought of as a composite of all areas of inquiry where we use observations or experiemnts for purposes such as describing existing conditions or verifying or disproving claims, statements, or hypotheses about relationships among variables. Historical inquiry, in general, is the study of development of organizations of people (e.g., into cultures or nations) and the study of particular lives, movements, or sequences of events. Philosophical inquiry is closely akin to rational analysis, loosely based on formal logic and semantics. In addition, linguistic analysis and studies of morals and ethics are appropriately subsumed under this general rubric.

In empirical inquiry, the data are generally observations or indirect measures of behavior, perceptions, aspirations, and the like. Historical inquiry deals more with narrative examination of available evidence (often prose of other men) that relates to the historic phenomenon of interest. Philosophical inquiry is somewhat like mathematics in that axioms, formal propositions, and rules of logic are often the "data" of concern.

In Figure 1, the areas of overlap are attempts to portray activities which draw from more than one type of inquiry. For example, the overlap between empirical and historical inquiry would include historiography, where empirical techniques such as surveys and interviews might be used

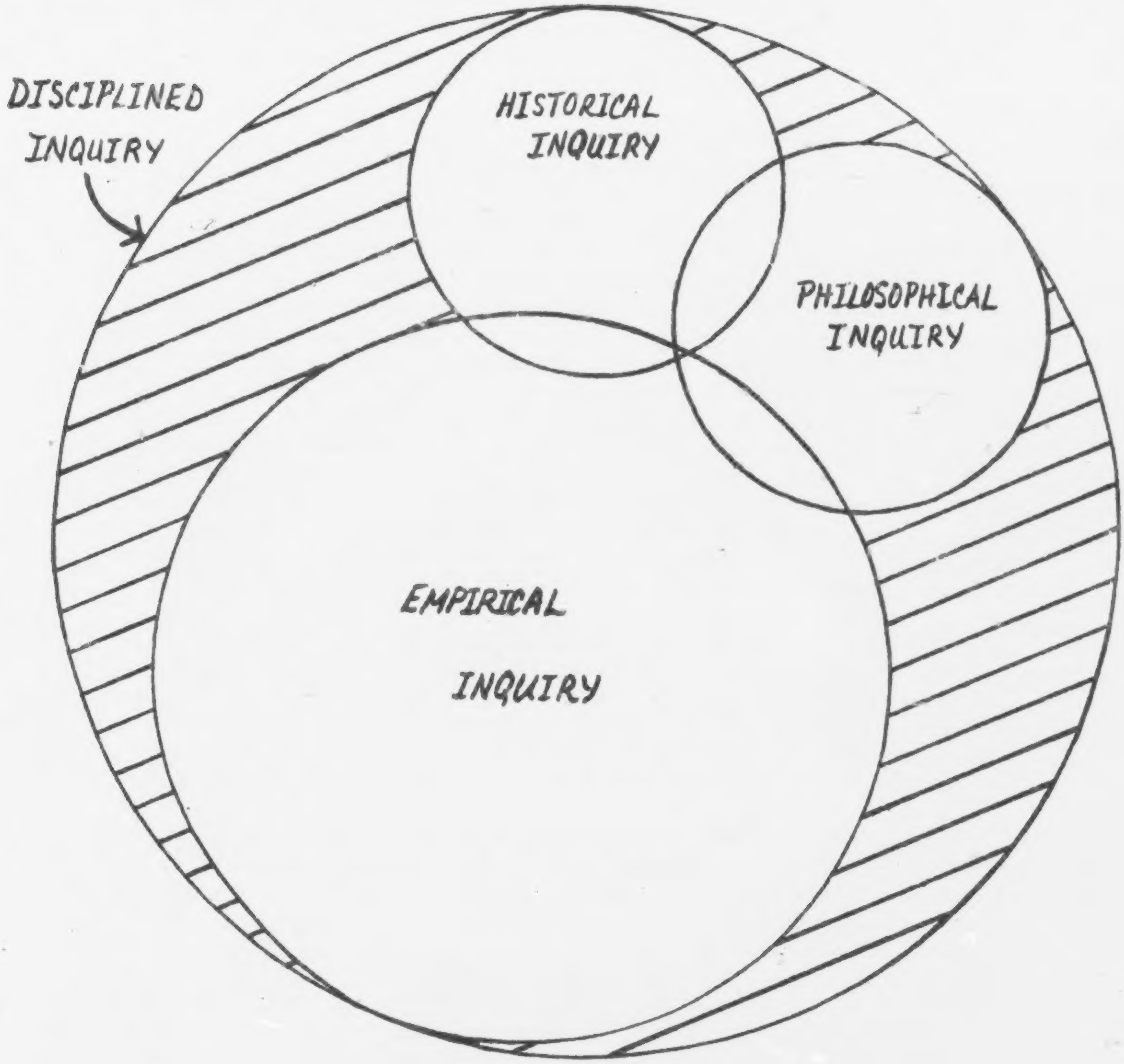
DISCIPLINED INQUIRY
HISTORICAL INQUIRY
PHILOSOPHICAL INQUIRY
EMPIRICAL INQUIRY

FIG. 1. The inquiry domain.

to prepare a contemporary history (e.g., the history of the IBM Corporation or Dow Chemical Company).

The overlap between empirical and philosophical inquiry might contain a variety of activities, such as the use of empirical techniques to study various meanings ascribed to key words by persons with differing philosophic orientation. The use of empirical methods to collect data on values of specified groups to enable one to check logical intravalue consistency would also be a combination of these two types of inquiry, as would also collection of empirical information to determine feasibility of alternative goals (which themselves are value-based) in establishing educational priorities and objectives. Still another type of inquiry that fits here is represented by morals or ethical studies--studies aimed at determining what is right or good. For example, one can espouse the philosophical view that all men have the prima facie right to live and still be faced with a dilemma in operational translation of that view when confronted with a greater number of patients who need heart transplants than the number of such organs available for transplants. Empirical evidence of other physical corollaries of probable success of the operation would be necessary, and one might even argue that each candidate's probable benefit to society should be a criterion that would require reexamination of the philosophical view and further inquiry of this type.

The overlap between historical and philosophical inquiry might well include inquiry into the probable impact of the nonaggressive philosophy of Eskimos on the historical decline of their culture as contact increased with more aggressive cultures. Conducting an examination of sixteenth-century persecution of religious minorities by church-influenced sectarian governments as an adjunct to inquiring into the appropriateness of maintaining church and state as separate might also illustrate a blend of these types of inquiry.

Inquiry Activities: Research (Basic to Applied) and Evaluation

Distinguishing between research and evaluation is at best extremely difficult and is made no simpler by the fact that each can in turn be subdivided into several distinct activities. Many researchers have proposed their favored schemes for classifying types of research activity (e.g., Kerlinger, 1964; Hillway, 1964; and Galfo and Miller, 1970) and some have discussed the merits of several alternative classification schemes (e.g., Guba and Clark, undated). Similarly, several contemporary evaluation theorists (e.g., Scriven, 1967; Stake, 1967a; Stufflebeam, 1968; Provus, 1969) have proposed varying types of evaluation. In every case the specified research or evaluation activity produces knowledge, however general or specific, not previously available. With this rather trivial commonality in mind, we turn our attention to the more important differences among these activities.

The distinction between basic and applied research seeems to be well entrenched in the parlance of educational research. Although these constructs might more properly be thought of as ends of a continuum than as a dichotomy, they do have utility for differentiating between broad classes of inquiry activities.[4] The distinction between the two also helps in subsequent consideration of the relationship of research to evaluation. The National Science Foundation (1960) adopted the following definitions of basic and applied research:

> "Basic research is directed toward increase of knowledge; it is research where the primary aim of the investigator is a fuller understanding of the subject under study rather than a practical application thereof. Applied research is directed toward practical applications of knowledge. [Applied research projects] have specific commercial objectives with respect to either products or processes" [p. 5].

Applied research, when successful, results in plans, blueprints, or directives for development in ways that basic research does not--this point will be elaborated later in the section dealing with the relationship of research to development. In applied research, the knowledge produced must have almost immediate utility; no such constraint is imposed on basic research. Basic research results in greater understanding of phenomena in systems of related phenomena; the practical utility of this knowledge need not be clearly foreseen.

The opinion is frequently expressed that educational research can never be basic research because education is a "practice," unlike psychology, biology, etc., which are "basic." Such reasoning is mere word play, not unlike arguing that basic research in physics is impossible because a carpenter "practices physics" when he sets a screw (inclined plane) or pulls a nail (lever and fulcrum). Ebel (1967, p. 81) gave as one of his reasons for the statement that "basic research in education can promise very little improvement in the process of education" that "the process of education is not a natural phenomenon of the kind that has sometimes rewarded scientific study in astronomy, physics, chemistry, geology, and biology." (Note that in the selection of examples economics, sociology, anthropology, etc., were not included.) The English jurist Glanville Williams, writing in The Sanctity of Life and the Criminal Law (Knopf, 1968), dispensed with "arguments from nature" against contraception as follows: ". . .the statement that an act is unnatural, coming from a moralist, means little more than that he does not like it" [p. 60]. Similarly, Ebel's use of the word "natural" appears to mean little more than that he would prefer to exclude education from basic inquiry.

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[4] Guba and Clark (undated manuscript) argued that the basic-applied distinction is dysfunctional and that the two kinds of activities do not rightfully belong on the same continuum. The authors admit to problems with this, as with any, classification scheme. However, attempts to replace such accepted distinctions with yet another classification system seem destined to little more success than discarding the descriptors "Democrat" and "Republican" because of recognition of wide variance within the political parties.

Two activities that might be considered variants of applied research are "institutional research" and "operations research," activities directed toward supplying institutions or social systems with data relevant to their operations. To the extent that the conclusions of inquiries of this type are generalizable, at least across time, these activities may appropriately be subsumed under the research rubric. However, where the object of the search becomes nongeneralizable information on performance characteristics of a specific program or process, the label "evaluation" is more appropriate.

Evaluation has sometimes been considered merely a form of applied research which focuses only on one curriculum, one program, or one lesson. This view ignores an obvious difference between the two--the level of generality of the knowledge produced. Applied research (as opposed to basic research) is mission-oriented and aimed at producing knowledge relevant to providing a solution (generalizable) to a *general* problem. Evaluation is focused on collecting *specific* information relevant to a specific problem, program, or product.

It was mentioned earlier that many "types" of evaluation have been proposed in writings on the subject. Although we are uncomfortable with the artificiality of some of the proposed classification schemes, it is tempting to include as evaluation activities several widely discussed, inquiry-related processes, if only to enrich the abstract construct by proliferating instances of the class. For example, the process of needs analysis (identifying and comparing intended outcomes of a system with actual outcomes on specified variables) might well qualify as an evaluation activity if, as Scriven (1967) and Stake (1970) suggested, the intended outcomes are themselves thoroughly evaluated. The assessment of alternative plans for attaining specified objectives might also be considered a unique evaluation function (see the discussion of "input" evaluation by Stufflebeam, 1968), although it might more properly be considered a variant form of outcome evaluation occurring earlier in the temporal sequence and attempting to establish the worth of alternative plans for meeting desired goals. Other proposed evaluation activities such as "program monitoring" (Worthen and Gagne, 1969) or "process evaluation" (Stufflebeam, 1968) seem to belong less to evaluation than to operations management or some other function in which information is collected and decisions are made but no explicit valuation occurs. Of course, values are revealed through decisions and choices, but valuing and choosing can and should be distinguished, if for no other reason than to prevent educational evaluators from turning away from answering difficult value questions toward less threatening activites (e.g., needs assessment, context description, process monitoring) that are not intrinsically evaluative. These activities may be attendant to a legitimate formative or summative evaluation, but they are means of accomplishing a comprehensive evaluation and not evaluation in and of themselves. We object to the description of context being labeled "context *evaluation*" or the monitoring of the conduct of a program being called "process *evaluation*." Typically neither contexts nor processes have been evaluated when these terms are used; they have simply been observed and described. The practitioner may be led by such reckless language into the error of thinking he has discharged a responsibility to evaluate his program (when in fact he has merely planned it, tried it out, or described it).

Our concern with whether or not essentially nonevaluative activities of the types discussed above should be considered as "evaluation" stems from the conflict between the roles and the goals of evaluation mentioned by Scriven (1967). Evaluation can contribute to the construction of a curriculum, the prediction of academic success, the improvement of an existing course or the analysis of a school district's need for compensatory education. But these are roles it can play and not its goal. The goal of evaluation must be to answer questions of selection, adoption, support, and worth of educational materials and activities. It must be directed toward answering questions like: "Are the benefits of this curriculum worth its cost?" or "Is this textbook superior to its competitors?". The typical evaluator is trained to play more roles than that of simply evaluating. However, all of his activities (e.g., test construction, needs assessment, context description) do not become evaluation by merit of the fact that they are done by an "evaluator." (Evaluators brush their teeth, but teeth brushing is not therefore evaluation.)

A danger inheres in attempts to develop evaluation models that are basically models of the collection of data for decision-making. Such models neglect two fundamental points of Scriven's (1969) definition of evaluation, viz., that the "activity consists in the . . . combining of performance data with a weighted set of goal scales to yield either comparative or numerical ratings, and in the justification of (a) the data-gathering instruments, (b) the weightings, and (c) the selection of goals" [p. 40].

Decision-centered evaluation methodologists argue that values are included in their thinking and their models because a decision is always the revelation of a value: if the decision-maker chooses A over B, he values A more than B. They believe that values are implicit in decisions. For example, Guba and Stufflebeam (1968) contended that:

> "The process described as evaluation here comes much closer to the root meaning of the term, to evaluate, than does the process which currently masquerades under the name; we might argue that if a name were to be changed it ought to be that of present practice. Values come most meaningfully into play when there are choices to be made, and the making of choices is the essential act of decision-making. What we are proposing here is that the entire act of evaluation should center on the criteria to be invoked in making decisions. As we shall see, it is through the exposing of such criteria that we obtain guidance about the kinds of information that should be collected, how it should be analyzed, and how it should be reported. The term evaluation seems to be particularly suited to the process as described here, since that process makes such distinctive use of value concepts" [p. 28].

For a "values-centered evaluator," however, decisions are implicit in evaluation, i.e., in the process of measurement against value scales, integration of measures into value-statements, and the justification of the measurement and the means of integrating the measurements. The alternative that scores highest on a weighted combination of value scales would be the preferable alternative. However, a decision-centered evaluation model can be applied without concentrating attention on the process by which a decision-maker integrates information into an overall judgment.

Equating values with preferences has precedent in economics. To the economist--historically at least--the value of a product is revealed by preferences for it: if the consumer will pay $5.00 for A, then the value of A is $5.00. Such a simplistic definition of "value" treats wise and foolish evaluation equally; any $5.00 product is as valuable as any other $5.00 product. Women regularly pay $5.00 per ounce (market value) for a beauty cream, although the constituents--materials and labor--of that cream cost only 25¢ (the true value of the product). That the cream can be marketed for $5.00 is testimony to the consumers' irrational belief that expensive products must also be high-quality products. The difference between decision-centered evaluation theorists and values-centered theorists is the difference between fixing the value of the beauty cream at $5.00 because women will pay that price for it and fixing its value at 25¢ because the total investment is a quarter. The analogy to educational evaluation is distressingly apt. Administrators have been known to choose teaching method A instead of method B, despite evaluative data to the contrary or no data at all, because A is expensive. The logic runs like this: "Surely all that expensive gadgetry and those priceless materials would not have been produced unless they are an improvement over old methods."

It would be satisfactory to disregard the direct assessment of value and merely provide data to decision-makers if decision-makers' preferences were always logical, rational, intelligent revelations of value. In truth, most decision-makers are perplexed by the decision-making process, and many of them rightly feel guilty and insecure about their inability to justify their decisions. Hence, it seems unwise to view evaluation as the presentation of data to decision-makers who must then make the data what they will.

Evaluation can play many roles in an educational program; it can aid the developers by providing mastery test data, it can provide data to facilitate administration of the program, etc. However, the goal of evaluation must always be to provide an answer to an all-important question: Does the program under observation have greater value than its competitors or sufficient value of itself that it should be maintained?

Unless inclusion of hybrid inquiry activities becomes essential to the point under consideration, the terms "research" and "evaluation" will be used in the remainder of this paper to refer to the "purest" form of each, basic research and outcome evaluation. This approach results in oversimplifications, but in discussing the many nuances of meaning we might have obscured the major points we wish to make.

In Figure 2, the place of educational research and evaluation in the inquiry domain is depicted. The field on which they are imposed is the same as in Figure 1--language usage. An element in the field is

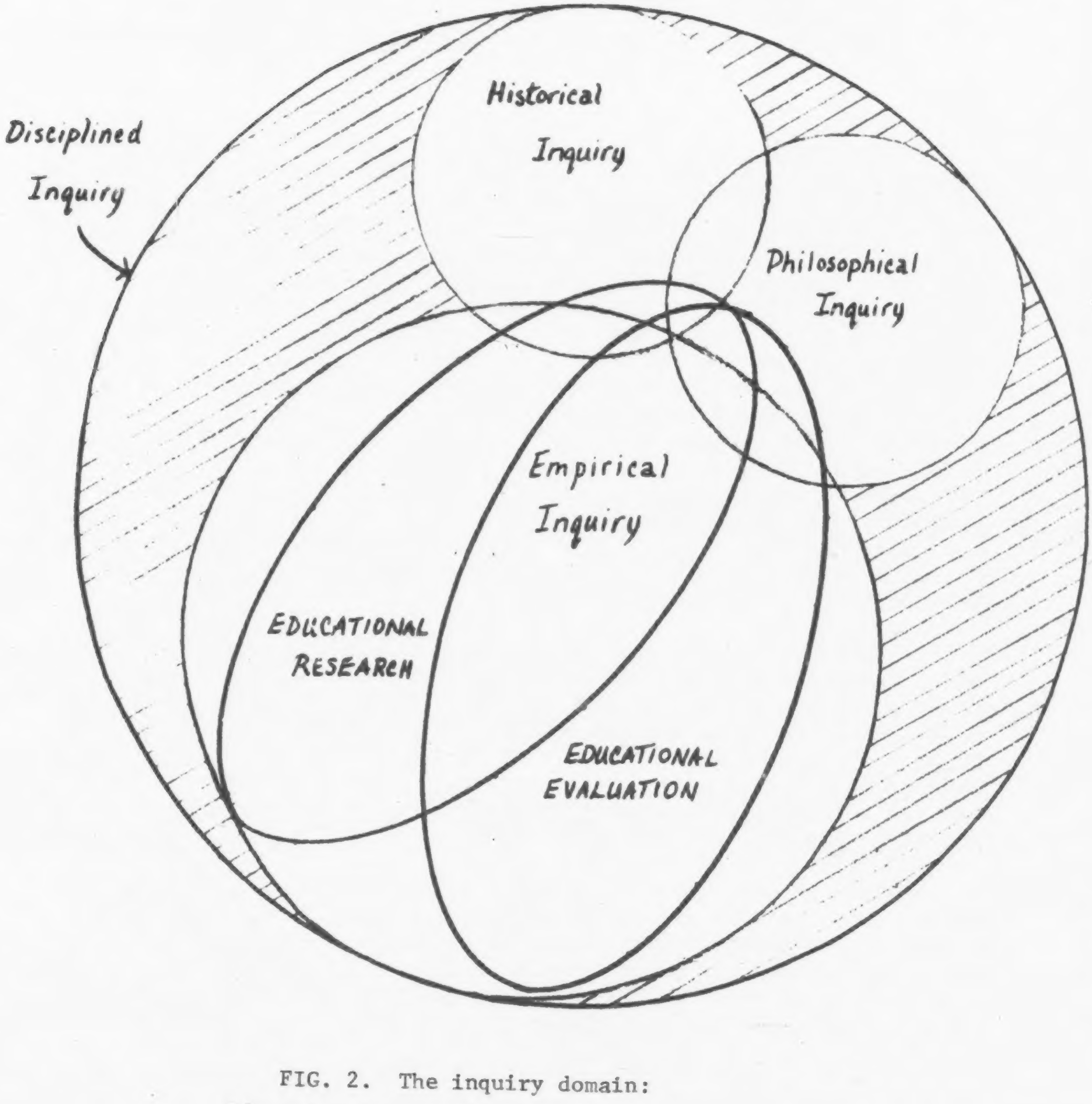
Disciplined Inquiry
Historical Inquiry
Philosophical Inquiry
Empirical Inquiry
EDUCATIONAL RESEARCH
EDUCATIONAL EVALUATION

FIG. 2. The inquiry domain:
Educational research and evaluation.

an instance of an inquiry activity being referred to by educationists as either "research" or "evaluation." The overlap between research and evaluation is in recognition of commonalities between the two activities which make it difficult to classify some activities unequivocally in either category.

If the field on which Figure 2 is imposed is changed, the relative position of research and evaluation changes also. For example, if the field on which they are imposed consists of techniques and methods, there would be considerably more overlap between these activities than shown in Figure 2, since both research and evaluation are primarily dependent upon empirical techniques and methods. However, the two elipses would not be coincident, since research and evaluation draw on nonempirical types of inquiry in somewhat different proportions. Educational research draws somewhat on both historical and philosophical inquiry. Evaluation, with emphasis upon immediate value questions and no real interest in generalizing across time, draws heavily on philosophical inquiry but little upon historical inquiry.

If the field for Figure 2 becomes the purpose for which the activity is conducted, there would be little overlap between research and evaluation since the object of the search is quite different for these activities (as will be argued later in this paper).

Inquiry-related Activities: Development and Diffusion

Educational development can be viewed as consisting of three basic processes: (*a*) inventing the idea or designing the prototype of the product, (*b*) engineering and production of the item, and (*c*) testing the product in settings like that in which it would be used. Two of these processes seem to be related to inquiry. The invention stage may be heuristically related to research in that research findings may stimulate ideas for developmental efforts (this thesis will be more fully developed later). More directly, the testing stage is obviously evaluation by another name.

Diffusion of research knowledge or developed products includes at least three stages: (*a*) dissemination, (*b*) demonstration, and (*c*) facilitation of adoption.[5] Although all of these stages are necessary if research and development are to influence educational practices, none of them is an inquiry activity per se.[6] Consequently, diffusion is considered as inquiry-related in that it is essential for the implementation of the products of research and development activities.

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[5] One of the earliest and best descriptions of these processes was provided by Clark and Guba (1965).

[6] We have been soundly criticized for taking this position (primarily by persons working as diffusers) and have reexamined our position. However much we would like to placate our critics, we remain unconvinced that diffusion can really be thought of as inquiry in any meaningful sense. It is true that inquiry might be used in relation to such activities, e.g., market analysis in identifying dissemination targets. In the same vein, inquiry can be used in relation to almost any phenomenon, e.g., opinion polls of voter preferences in planning campaign strategies. However, such usage does not qualify politics as an inquiry activity any more than it does diffusion as an inquiry activity.

The relationships of development and diffusion to the inquiry domain are depicted in Figure 3.

In the following sections, further attempts will be made to elaborate each of the four major inquiry-related activities. Since development and diffusion are easier to define and contrast than research and evaluation, we shall deal primarily with characteristics of the latter activities in the next major section of this paper, in which attention is further focused on problems of definition. In the last half of the paper--where the major concern is the implementation of educational inquiry--we shall return to development and diffusion.

The Relationship of Research to Evaluation

In this section we present (*a*) a discussion of characteristics of inquiry that distinguish educational research from evaluation, (*b*) a consideration of distinguishing features in the implementation of research and evaluation, and (*c*) a summary statement of the relationship of research to evaluation.

Characteristics of Inquiry which Distinguish Research from Evaluation

Research and evaluation have many defining characteristics. Each is only imperfectly correlated with the tendency of informed men to call activity A "research" and activity B "evaluation" (just as a clinical psychologist uses "anxiety" as a construct to differentiate instances of behavior in a way that is not perfectly reproduced by any single measure or defining characteristic). The conceptualization of research and evaluation is enriched by the identification of any characteristic of inquiry which has a nonzero correlation with the tendency of intelligent men to speak of "research" or "evaluation" when discussing a particular inquiry activity.[7]

Ten characteristics of inquiry which distinguish research from evaluation are discussed below.

1. *Motivation of the inquirer*. Research and evaluation appear generally to be undertaken for different reasons. Research is pursued largely to satisfy curiosity; evaluation is intended to contribute to the solution of a particular kind of practical problem. The researcher is intrigued; the evaluator (or, at least, his client) is concerned.

Although the researcher may believe that his work has great long-range payoff, he is no less motivated by curiosity when performing his

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[7] Scriven (1958, p. 175) referred to such terms as "cluster concepts" or "correlational concepts." Such concepts, e.g., "schizophrenia," are known by their indicators, all of which are imperfectly related to them.

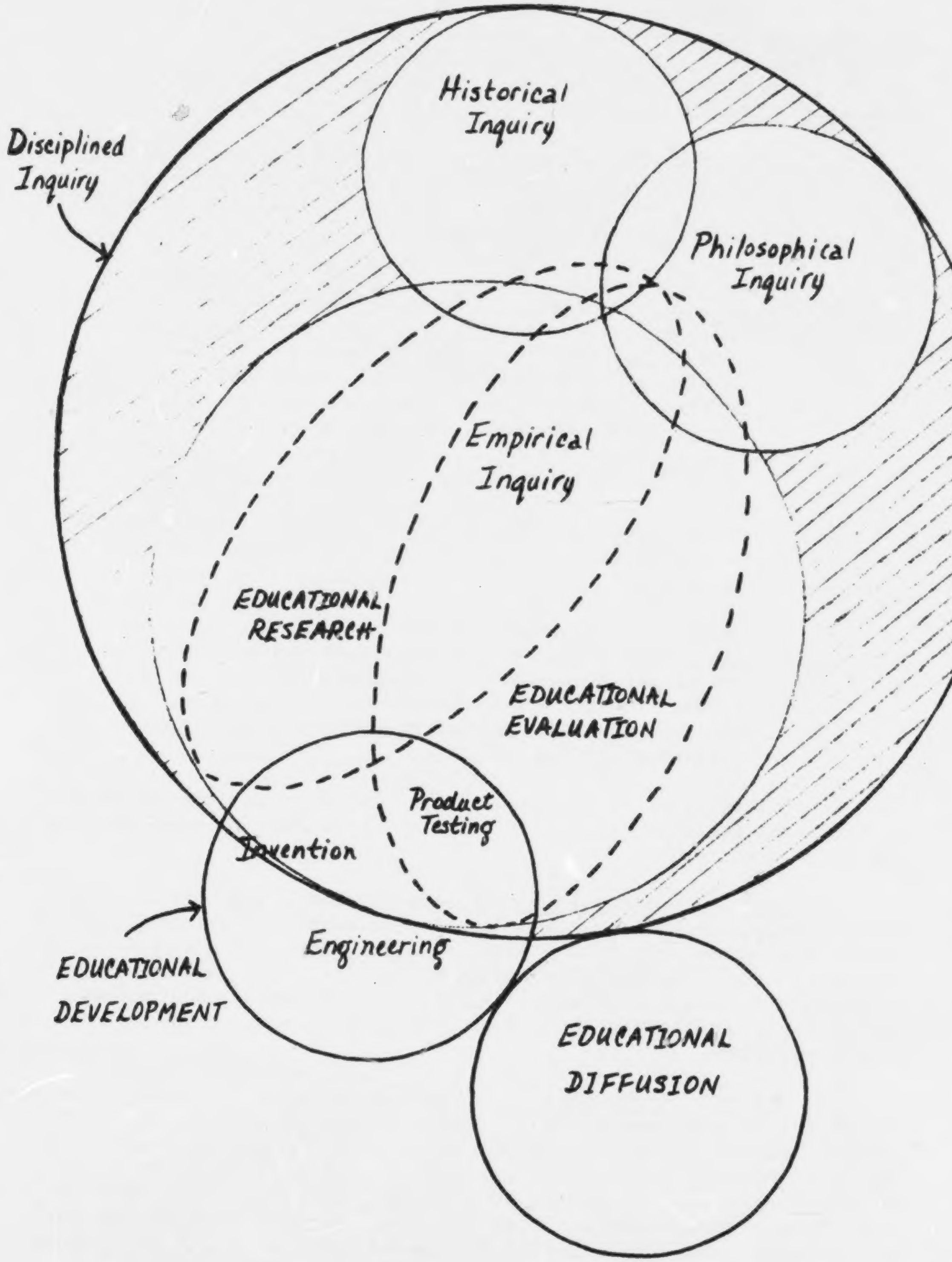
Historical Inquiry
Disciplined Inquiry
Philosophical Inquiry
Empirical Inquiry
EDUCATIONAL RESEARCH
EDUCATIONAL EVALUATION
Product Testing
Invention
Engineering
EDUCATIONAL DEVELOPMENT
EDUCATIONAL DIFFUSION

FIG. 3. The inquiry domain: Educational research, evaluation, development, and diffusion.

unique function. One must be nimble to avoid becoming bogged down in the seeming paradox that the *policy* decision to support basic inquiry because of its ultimate practical payoff does *not* imply that researchers are pursuing practical ends in their daily work. Scriven (   ) has argued that, as regards research in mathematics, practical payoff is increased to the extent that the mathematician is convinced he is not seeking practically significant results.

2. *The object of the search*. Research and evaluation seek different ends. Research seeks *conclusions*; evaluation leads to *decisions* (see Tukey, 1960). Cronbach and Suppes (1969) distinguished between decision-oriented and conclusion-oriented inquiry:

> "In a decision-oriented study the investigator is asked to provide information wanted by a decision-maker: a school administrator, a government policy-maker, the manager of a project to develop a new biology textbook, or the like. The decision-oriented study is a commissioned study. The decision-maker believes that he needs information to guide his actions and he poses the question to the investigator. The conclusion-oriented study, on the other hand, takes its direction from the investigator's commitments and hunches. The educational decision-maker can, at most, arouse the investigator's interest in a problem. The latter formulates his own question, usually a general one rather than a question about a particular institution. The aim is to conceptualize and understand the chosen phenomenon; a particular finding is only a means to that end. Therefore, he concentrates on persons and settings that he expects to be enlightening" [pp. 20-21].

Conclusion-oriented inquiry is much like what is here referred to as research; decision-oriented inquiry typifies evaluation as well as any three words can.

3. *Laws vs. descriptions*. Closely related to the distinction between conclusion-oriented and decision-oriented are the familiar concepts of *nomothetic* (law giving) and *idiographic* (descriptive of the particular). Research is the quest for laws, i.e., statements of relationship among two or more variables or phenomena. Evaluation merely seeks to describe a particular thing with respect to one or more scales of value.

4. *The role of explanation*. The nomothetic and idiographic converge in the act of explanation, viz., the conjoining of general laws with descriptions of particular circumstances as in "if you like three-minute eggs back home in Portland you'd better ask for a five-minute egg at the Brown Palace in Denver *because* the boiling point of water is directly proportional to the absolute pressure (the law), and at 5,280 ft. the air pressure is so low in Denver that water boils at 195 F (the circum-

stances)." Scientific explanations require scientific laws, and the disciplines related to education appear to be far from discovery of the general laws on which to base explanations of incidents of schooling.

There is considerable debate among investigators in education about the extent to which evaluators should explain ("understand") the phenomena they evaluate. We do not view explanations as the goal of evaluation. A fully proper and useful evaluation can be conducted without explaining *why* the product or program being evaluated is good or bad or *how* it produces its effects. This is fortunate, since evaluation in education is so needed and credible explanations of educational phenomena are so rare.

5. *Autonomy of the inquiry*. Science as an independent and autonomous enterprise is such an important principle that Kaplan (1964) wrote first of it in *The Conduct of Inquiry*:

> "It is one of the themes of this book that the various sciences, taken together, are not colonies subject to the governance of logic, methodology, philosophy of science, or any other discipline whatever, but are, and of right ought to be, free and independent. Following John Dewey, I shall refer to this declaration of scientific independence as the principle of *autonomy of inquiry*. It is the principle that the pursuit of truth is accountable to nothing and to no one not a part of that pursuit itself" [p. 3].

Not surprisingly, autonomy of inquiry proves to be an important characteristic for typifying research and evaluation. As was seen incidentally in the above quote from Cronbach and Suppes, evaluation is undertaken at the behest of a client, but the researcher sets his own problems. As will be seen later, the autonomy which the researcher and the evaluator enjoy to differing degrees has implications for how their respective inquiries are pursued.

6. *Properties of the phenomena which are assessed*. Education evaluation is an attempt to assess the *worth* of a thing and education research is an attempt to assess scientific truth. Except that truth is highly valued and thus worthwhile, this distinction serves fairly well to discriminate research and evaluation. The distinction can be given added meaning if "worth" is taken as synonymous with "social utility" (which is presumed[8] to increase with improved health, happiness,

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[8] That evaluators must "presume" that certain conditions are worthwhile and to be sought after leads to what Scriven called the "point-of-entry problem in evaluation [personal communication]." Every act of evaluation must enter a chain of justification of valued states at some point short of the philosopher's rationalization of such elusive concepts as "the good life." Educational evaluation can not solve the problems of philosophy. Perhaps the best advice for the evaluator is to enter at one state above his client, seeking justification for the client's definition of "worth" but not for his own.

life expectancy, etc., and to decrease with increases in privation, sickness, ignorance, etc.) and if "scientific truth" is identified with two of its possible forms: (a) empirical verifiability of statements about general phenomena with accepted methods of inquiry; (b) logical consistency of such statements.

Evaluation seeks directly to assess social utility. Research may yield evidence of social utility, but only indirectly--because empirical verifiability of general phenomena and logical consistency may eventually be socially useful. A touchstone for discriminating an evaluator and a researcher is to ask whether the inquiry would be regarded as a failure if it produced no information on whether the phenomenon studied was useful or useless. A research answer *qua* researcher will probably say "No."

In the above view, inquiry is seen as directed toward the assessment of three properties of statements about a phenomenon: (a) its empirical verifiability by accepted methods; (b) its logical consistency with other accepted or known facts; and (c) its social utility. Most disciplined inquiry aims to assess each property in varying degrees. In Figure 4, several areas of inquiry within the field of psychology are classified with respect to the degree to which they seek to assess each of the above three properties. The distance of a point in the triangle from each of the vertices is inversely related to the extent to which the property represented by the vertex is sought by the particular inquiry.[9]

7. "*Universality*" *of the phenomena studied*. Perhaps the highest correlate of the research-evaluation distinction is the "universality" of the phenomena being studied. (We apologize for the grandness of the term "universal" and our inability to find a more humble word to convey the same meaning.) Researchers work with constructs having a currency and scope of application which make the objects one evaluates seem parochial by comparison. An educational psychologist experiments with reinforcement" or "need achievement" which he regards as neither specific to geography nor to one point in time. The effects of positive reinforcement following upon a response are assumed to be phenomena evidenced in most men in most times; moreover the number of specific instances of human behavior which are examples of the working of positive reinforcement is great. Not so with the phenomena studied in evaluation. A particular textbook, an organizational plan, and a film strip have a short life expectancy and may not be widely shared. However, whenever their cost or potential payoff rises above a negligible level, they are of interest to the evaluator.

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[9] Since this conceptualization of inquiry was first presented (Glass, 1969), the authors have found some interesting corroboration of an authoritative sort. The definition of "theory" in Webster's *Third New International Dictionary* (1966) is tripartite: "The coherent set of hypothetical, conceptual and pragmatic principles forming the general form of reference for a field of inquiry (as for deducing principles, formulating hypotheses for testing, undertaking actions)." The three inquiry activities in Webster's definition correspond closely to the three inquiry properties in Figure 4.

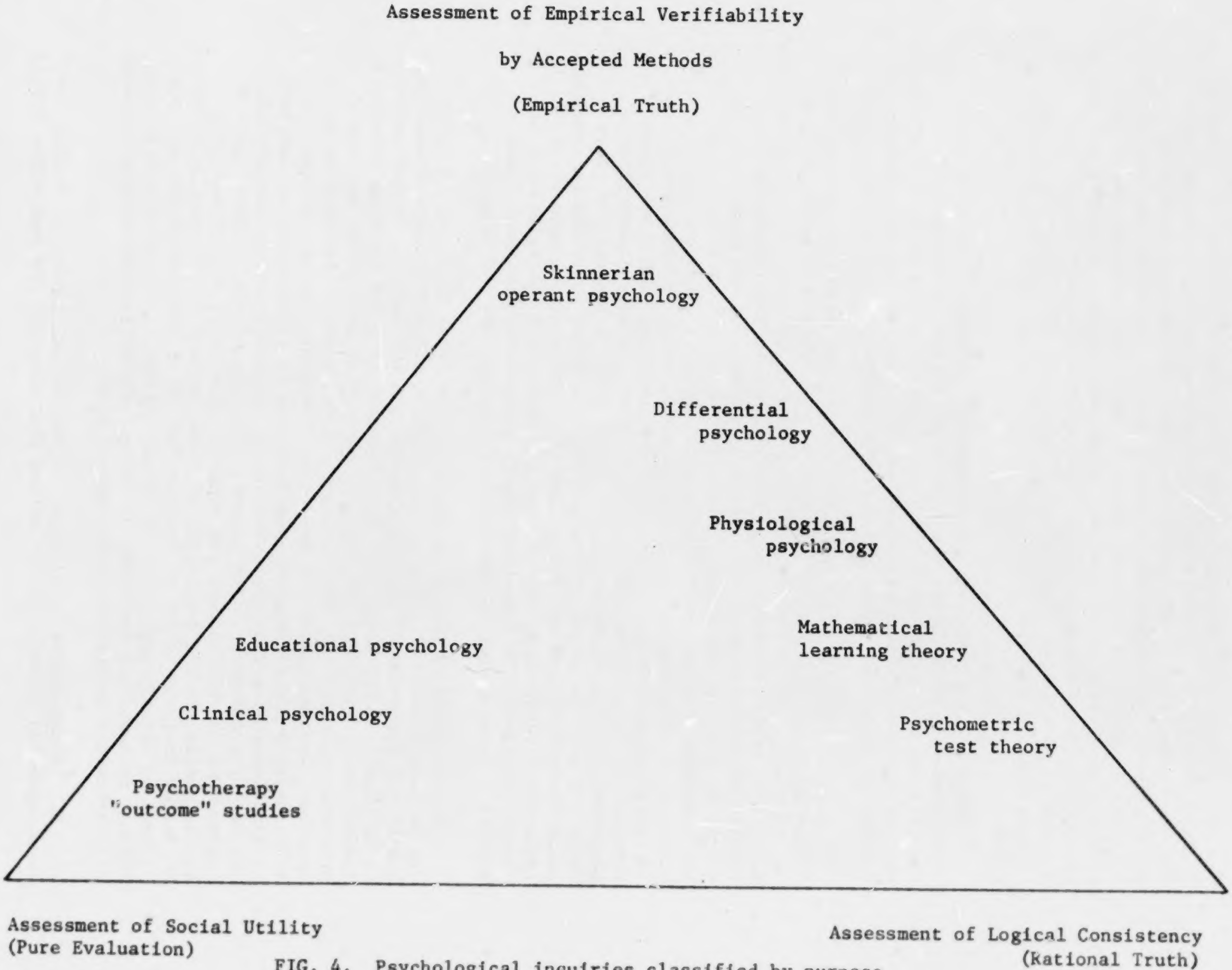
Assessment of Empirical Verifiability
by Accepted Methods
(Empirical Truth)
Skinnerian operant psychology
Differential psychology
Physiological psychology
Mathematical learning theory
Psychometric test theory
Educational psychology
Clinical psychology
Psychotherapy "outcome" studies
Assessment of Social Utility (Pure Evaluation)
Assessment of Logical Consistency (Rational Truth)

FIG. 4. Psychological inquiries classified by purpose.

Three aspects of the generalizability ("universality") of a phenomenon can be identified: (a) generality across time (Will the phenomenon--e.g., a textbook or a particular "self-concept"--be of interest 50 years hence?); (b) generality across geography (Is the phenomenon of any interest to people in the next town, the next state, across the ocean?); and, (c) applicability to a number of specific instances of the general phenomenon (Are there many specific examples of the phenomenon being studied or is this the "one and only"?). These three features of the object of an educational inquiry can be used to classify different inquiry types.

Three types of inquiry are represented in Figure 5: (a) program evaluation--the evaluation of a complex of people, materials, and organization which make up a particular educational program; (b) product evaluation--the evaluation of a medium of schooling such as a book, a film, or a recorded tape; and, (c) educational research.

Program evaluation is depicted as concerned with a phenomenon (an "educational program") which has limited generalizability across time and geography; the innovative "ecology curriculum" (including instructional materials, staff, students, and other courses in the school) in the Middletown Public Schools will probably not survive the decade, is of little interest to the schools in Norfolk which have a different set of environmental problems and instructional resources, and has little relationship to other curricula with other objectives. Product evaluation is concerned with assessing the worth of something like a new ecology textbook or an overhead projector which can be widely disseminated geographically but which similarly will not be of interest 10 years hence nor does the study of its properties produce any reliable knowledge about the educational process in general. The concepts upon which educational research is carried out are supposed to be relatively permanent, applicable to schooling nearly everywhere, and they should subsume a large number of instances of teaching and learning.

8. Salience of the value question. At least in theory, a value can be placed on the outcome of any inquiry, and all inquiry is directed toward the discovery of something worthwhile and useful. In evaluation it is usually quite clear that some question of value is being addressed. Indeed, value questions are the sine qua non of evaluation and usually determine what information is sought. This is not to say that value questions are not germane in research. The goals may be the same for both research and evaluation--placing value on alternative explanations or hypotheses--but the roles, the use to which information may be put, may be quite different. For example, the acquisition of knowledge and improvement of self-concept are clearly value-laden objectives. The value question in the derivation of a new oblique transformation technique in factor analysis is not so obvious, but it is there nonetheless. Our purpose in raising this point is to call attention to the fact that with respect to assessing the value of things, the difference between research and evaluation is one of degree, not of kind.

9. Investigative techniques. A substantial amount of opinion has been expressed recently to the effect that research and evaluation should

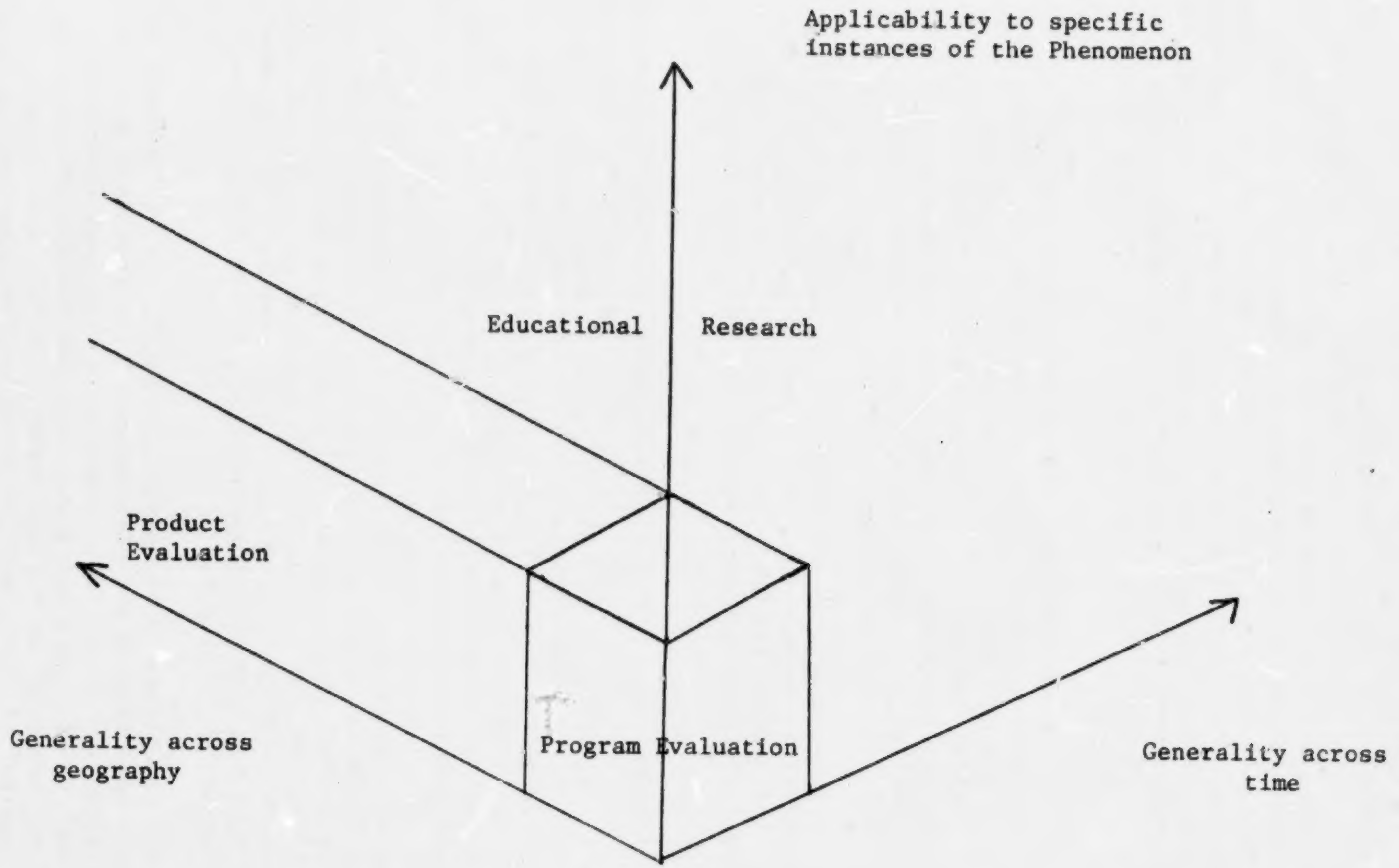
Applicability to specific instances of the Phenomenon
Educational
Research
Product Evaluation
Program Evaluation
Generality across geography
Generality across time

FIG. 5. Three inquiry types classified by the "universality" of the phenomenon investigated. (The property represented by each axis is absent where the three axes meet and increases as one moves out along each axis.)

employ different techniques for gathering and processing data, that the methods appropriate to research--such as comparative experimental design--are not appropriate to evaluation, or that with respect to techniques of empirical inquiry, evaluation is a thing apart (Cronbach, 1963; Carroll, 1965; Stufflebeam, 1968; Guba and Stufflebeam, 1968). For example, Guba and Stufflebeam wrote: "On the surface, the application of experimental design to evaluation problems seems reasonable, since traditionally both experimental research and evaluation have been used to test hypotheses about the effects of treatments. However, there are . . . distinct problems with this reasoning" [p. 14]. Most of the alleged problems, however, stem from Guba and Stufflebeam's conception of the comparative experiment. They asserted that for comparative designs to yield valid results:

> ". . . the treatment and control conditions must be applied and held constant throughout the period of the experiment, i.e., they must conform to the initial definitions of these conditions. The new or traditional program conditions could not be modified in process, since in that event one could not tell what was being evaluated" [p. 13].

Guba and Stufflebeam appear to conceive of "treatments" as being so narrowly and strictly defined that they permit decision-makers no freedom to adapt and modify treatments as they are being applied. Surely such confining treatments are not required for valid experimental comparisons.

An educational treatment may simply create an identifiable context within which decision-makers are free to adapt the program to the exigencies of the moment. A medical researcher evaluating a drug against a placebo is free to administer other substances to control side-effects or to vary the amount of dosage in accord with his observations of the progress of remission of the disease. Minor modifications during the course of an experiment do not destroy the validity of the drug vs. placebo comparison since they are often a necessary part of the context which is being evaluated, namely the "treatment of Disease X by Drug A." The decision-maker could, of course, so alter the context of the application of a treatment that the originally defined treatment is no longer being evaluated, as for example when a medical researcher stops administering the experimental drug because serious side-effects show up in the patients. In such instances, the opportunity to evaluate comparatively has simply been lost. However, that some comparisons may not be feasible does not make all comparisons impossible.

Guba and Stufflebeam also maintained that ". . . all students in the experiment must receive the same amount of the treatment to which they are assigned . . ." [p. 13]. Comparative experimental designs require no such thing. Here and above, Guba and Stufflebeam appear to conceive of a "treatment" as a fixed entity in nature like a quart of milk or an aspirin. A "treatment" in a comparative experiment is usually an abstraction--a construct--with defining characteristics which create a context; the context created is all that one can evaluate. The context seldom demands that all experimental subjects receive the same amount of something. Economists ran experiments on the "negative income tax" in New Jersey in the late 1960's; persons on a negative income tax plan were compared with persons on the conventional IRS plan on variables like unemployment rate, work incentive, spending and saving habits, etc. The very essence of the negative income tax is that its amount varies from person to person, yet no one claims that the comparison is thereby invalidated. Indeed, not all subjects need even receive the same thing, as when we evaluate individualized instruction.

Guba and Stufflebeam claimed that the application of comparative experimental design to evaluation problems ". . . conflicts with the principle that evaluation should facilitate the continual improvement of a program" and that ". . . it is useful for making decisions after a project has run full cycle but almost useless as a device for making decisions during the planning and implementation of a project" [pp. 14,15]. These criticisms were resolved earlier by Scriven's (1967) distinction between formative and summative evaluation when Cronbach (1963) raised the same points.

Comparative experimental design by Guba and Stufflebeam was faulted because of the "near impossibility" of controlling or eliminating "confounding variables" through randomization or otherwise. Cronbach (1963) raised the same point: "Any failure to equate the classes taking the competing courses will jeopardize the interpretation of an experiment and such failures are almost inevitable" [p. 676]. "Equation" of groups is an impossibility recognized early in the history of experimental design. In comparative experimental design groups are made "randomly equivalent"--which is not strictly equivalent at all--and postexperimental differences are inspected to reveal whether they are small enough to be attributed to the original random assignment or whether a treatment effect must be postulated to account for the large difference. Thus, valid experimental comparisons are not impossible just because experimenters cannot perfectly equate groups. Valid, probabilistic comparisons are possible, as the growing number of well-designed comparative experiments in education demonstrates. It is true that valid experimental designs are difficult and expensive to implement; but educational evaluators have yet to learn that such designs are usually worth the cost.

Finally, Guba and Stufflebeam (1968) wrote that: "A fourth problem inherent in the application of conventional experimental design is the possibility that while internal validity may be gained through the control of extraneous variables, such an achievement is accomplished at the expense of external validity" [p.16]. Internal and external validity are not incompatible. Designing experiments which evidence both types of validity to a high degree is simply a technological problem in instrumentation, data collection, and statistical analysis (see Bracht and Glass, 1968).

While there may be legitimate differences between research and evaluation methods, we see far more similarities than differences between research and evaluation with regard to the techniques by which empirical evidence is collected and judged to be sound. As Stake and Denny (1969) indicated:

> "The distinction between research and evaluation can be overstated as well as understated . . . Researchers and evaluators work within the same inquiry paradigm . . . [training programs for] both must include skill development in general educational research methodology" [p. 374].

Hemphill (1969) expressed the same opinion when he wrote: "The consequence of the differences between the proper function of evaluation studies and research studies is not to be found . . . in the methods of inquiry of the researcher and of the evaluator" [p. 220]. We shall return in a later section to the question of how research and evaluation differ in the techniques of investigation they employ.

The notion that evaluation is really only sloppy research has a low incidence in writing but a high incidence in conversation--usually among researchers but also among some evaluators. This bit of slander arises partly from a misconstruing of the concept of "experimental control." One form of experimental control is achieved by the randomization of extraneous influences in a comparative experiment so that the effect of an intervention (or treatment) on a dependent variable can be observed. Such control can be achieved either in the laboratory or the field; achieving it is a simple matter of designing an internally valid plan for assigning experimental units to treatment conditions. Basic research has no proprietary rights to such experimental control; it can be attained in the comparative study of two reinforcement schedules as well as in the comparative study of two curricula.

A second form of control concerns the ability of the experimenter to probe the complex of conditions he creates when he intervenes to set up an "independent variable" and to determine which critical element in a swarm of elements is fundamental in the causal relationship between independent and dependent variable. Control of this type occupies the greater part of the efforts of the researcher to gain understanding; however, it is properly of little concern to the evaluator. It is enough for the evaluator to know that something attendant upon the installation of curriculum A (and not an extraneous, "uncontrolled" influence unrelated to the curriculum) is responsible for the valued outcome; to give a more definite answer about what that something is would carry evaluation into analytic research. Analytic research on the nongeneralizable phenomena of evaluation is seldom worth the expense. In this sense only is evaluation "sloppy."

10. Criteria for judging the activity. The two most important criteria for judging the adequacy of research are internal validity (to what extent are the results of the study unequivocal and not confounded with extraneous or systematic uncontrolled variance) and external validity (to what extent can the results be generalized to other units --persons, classrooms, etc.). If one were forced to choose the two most important from among the several criteria which might be used for

judging the adequacy of evaluation, they would probably be isomorphism (to what extent is the information obtained isomorphic with the reality-based information desired) and credibility (to what extent is the information viewed as believable by clients who need to use the information).

Distinguishing Features in the Implementation of Research and Evaluation

There is a point to our concern with the abstract nature of different inquiry activities. It may seem that too much is being made of idiosyncratic definitions of "research" and "evaluation." We cannot help being greatly concerned with the meanings of words and, more importantly, with how they influence action. The meanings which "research," "evaluation," "development," and "diffusion" hold for a person make practical differences in how he will pursue inquiry. Often the most sincere and energetic efforts at inquiry are misdirected because of a semantic confusion. By happenstance, habit, or methodological bias, the trial and investigation of a new curriculum or organizational plan will be labeled an "experiment" instead of an "evaluation." The inquiry carried out is different for having been called an "experiment" and not an "evaluation." The choice of language predisposes the literature that the inquirer reads (it will deal with experimental design), the consultants he uses (experts in designing experiments), and how he reports the results (always in the best tradition of the Journal of Experimental Psychology). In some instances, none of these paths will lead to the relevant data or a sensible evaluation. The crucial data may be "soft" instead of "hard"; the object of the search may be valuations instead of explanations.

Abstract meaning can give direction to practical decisions; the examination of intelligent practice lends meaning to abstractions. Thus we dwell in the next few pages on two major practical implications of the concepts of inquiry presented thus far.

1. Disciplinary base. The call to make educational research multidisciplinary is good advice for the research community as a whole; but the individual researcher is ill-advised to attack his area of interest simultaneously from several different disciplinary bases. Some few men can fruitfully work in the cracks between disciplines; but most will find it challenge enough to deal with the problems of education from the perspective of one discipine at a time. The effort required to master even a small corner of a discipline works against making Leonardos of all educational researchers.

That the educational researcher can afford to pursue inquiry within one paradigm and the evaluation team cannot is a consequence of the autonomy of inquiry. When one is free to define his problems for inquiry (as the researcher is), he seldom asks a question that takes him outside of the discipline in which he was trained. Psychologists pose questions that can be solved by the methods of psychology. The seeds of the answer to a research question are planted with the question. The evaluation team enjoys less freedom in the definition of the questions they must answer. Hence, the answers are not as likely to be found by use of a traditional methodology. Typically, then, the evaluation team finds it necessary to employ a wider range of inquiry perspectives and techniques to deal with the question they must resolve.[10] (See Hastings, 1969.)

2. Training. The different roles which researchers and evaluators must play require different training programs. Five elements of graduate-level training programs for researchers and for evaluators are contrasted below.

(*a*) Disciplinary bases. Research aimed at producing understanding of such phenomena as school learning, the social organization of schools, human growth and development, etc., can best be accomplished from the perspectives afforded by the traditional social-sciences. The best training for many educational researchers is likely to be a thorough mastery of a relatively narrow, traditional, social science discipline. We regard as mistaken the notion of a unique science of education constructed out of unique educational constructs with methods of inquiry which are not already a part of the traditional social science.[11] Psychology, sociology, etc., are not so lacking in conceptual richness that they cannot be made to accommodate most of the phenomena of education. The fact that relatively few researchers trained in these disciplines exhibit interest in working on problems with apparent applicability in education does not negate the argument. Rather, it merely suggests that existing reward structures lead to most researchers conducting inquiry within their home discipline. One proposal for training would be to recruit vigorously among bachelor and master's degree holders in these behavioral and social sciences to attract them into our educational research programs. Then, their training could consist of continued preparation in their discipline coupled with application of the tools of that discipline to educational problems. We would anticipate that persons trained in this manner would do much to improve educational research by bringing the perspectives of the disciplines to bear.

This does not argue that any one researcher should receive training in more than one discipline. A research training program that attempts to train the same student in social psychology, physiological psychology and micro-economic theory is doomed; the result will be a researcher so superficially trained in several areas that he can contribute in none.

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[10] The discussion has taken on an utopian tone. In reality much evaluation is becoming as stereotyped as most research. Evaluators often take part in asking the question they will ultimately answer, and they are all too prone to generate questions out of a particular "evaluation model" (e.g., the Stake model, the CIPP model) rather than a "discipline." Stereotyping a method threatens evaluation as it threatens research (Glass, 1969).

[11] This does not mean that it is inappropriate to continue to train research methodologists within the field of education. "Educational research methodology" is an aggregate of techniques borrowed from agronomy, psychology, mathematics, etc., with some refinements of educationists. Persons trained in this area play critical roles in (*a*) developing and refining statistical techniques and (*b*) advising other educational researchers (whose strengths lie more in their discipline backgrounds than in their knowledge of methodology) in matters of design, statistics, etc.

By contrast, to the extent that the training of evaluators touches on the traditional disciplines at all, it is best that several disciplines be sampled. The trainee should appreciate the view of education afforded by each of the socially-relevant disciplines. In this way, the evaluator can become sensitive to the wide range of phenomena to which he must attend if he is to properly assess the worth of an educational program. That superficial exposure to the many social sciences does not train him to build a science of education is simply irrelevant.

(b) Methodological training. The evaluator's role is largely that of a methodological expert applying inquiry techniques to the solution of a particular type of practical problem. Consequently, emphasis in training must be given to such topics as statistical analysis, measurement and psychometrics, survey research methods, and experimental design. The techniques--in this sense--that a single evaluator might use are little different from the body of techniques of the empirical social sciences. (We confess no sympathy with the argument that such techniques as inferential statistics and comparative experimental design are not useful in evaluation, even though we agree that they are often misapplied. Guba and Stufflebeam, 1968, argued that comparative experimental design is inappropriate to the purposes of educational evaluation; an attempt to rebut the argument appears in Glass, 1969.)

The training program for the educational researcher need not be as broad in techniques of inquiry as that for the evaluator. Most sociologists' work is none the worse for their ignorance of confounding relations in fractional factorial designs, and who would argue that an experimental psychologist suffers from his ignorance of scalogram analysis? The training of researchers must be more concerned with substantive matters (e.g., Keynesian economics, Skinnerian operant conditioning, and cognitive dissonance theory) than with methods and techniques per se.

(c) Organizational and management training. Most educational research projects, funded or not, usually involve few persons--often only one. Such activities demand for their directors only minimal organizational or managerial skills. E. L. Thorndike probably never resorted to a PERT chart in any of his researches on the law of effect, for example.

It is difficult to determine whether educational research is typically small in scale because it is educational or because it is usually psychological. Sociologically based educational research, e.g., Coleman and Campbell's Equality of Educational Opportunity (1966), can become organizationally complex and impossible without great attention to management. However, such research seems to be the exception rather than the rule in education. In short, while all researchers could benefit exposure to concepts of project management such as PERT or critical path analysis, relatively few researchers will need extensive preparation in project organization and management.

Many evaluation efforts are essentially "one-man shows"--e.g., evaluation of many ESEA Title I and Title III projects fall into this category. However, many new evaluation units in public schools, state departments of education, and the like comprise a larger number of workers than most research projects. Also, the techniques used by evaluators are likely to be more diverse than those used by the unidisciplinary researcher. As a result, many evaluators in education may profit from more extensive training in management techniques. Organizing the efforts of large numbers of workers and managing diverse activities associated with evaluation clearly demand high level skills in management, especially if one adopts a systems or "team" model of evaluation such as that proposed by Provus (1969). Ralph Tyler surely operated with the 1930's equivalent of the PERT chart in directing the Eight Year Study, one of the earliest formal educational evaluations. Given the scope of some current evaluation efforts, even more management sophistication seems to be required.

(d) Practicum or internship training. Some provisions in training both researchers and evaluators must be made for the acquisition of practical experience to complement course work. Doubtless there is no better practical experience for the research trainee than apprenticeship to a competent, practicing researcher. Worthen and Roaden (1968) found that there is a significant relationship ($p < .001$) between genuine research assistantship experiences and subsequent productivity as an educational researcher. Moreover, it was found in a later study (Worthen and Roaden, 1970) that apprenticeship to one researcher over an extended period of time spent working on a variety of projects was positively correlated with subsequent productivity ($p < .025$) whereas an assignment to work on a single, isolated research project was not.

Internship experiences in public schools, state education departments and similar "front-line" institutions are probably unproductive in the training of researchers. Few researchers' capacity to produce good research has been enhanced by the firsthand knowledge that school administrators are subjected to political pressures, that junior-high teachers seldom have planning periods, or that students are too preoccupied to learn during the last two months of their senior year.

The internship experience "in the field" is entirely a different matter in the curriculum of the evaluation trainee. A protracted apprenticeship to a single researcher would be inappropriate in the training of the evaluator. Breadth of experience in a variety of settings is important. The researcher can afford to ignore--indeed, must ignore --the countless practical constraints of contemporary schools in constructing his elegant idealizations. Evaluation that ignores practicalities is just bad evaluation.

(e) Selection of trainees. Considering how little genuine change takes place in students even in intensive graduate-level training programs, the selection of trainees is as important as the experiences that comprise the programs. Logical criteria for trainee selection which are consistent with our conceptions of research and evaluation can be identified. Empirical validations of the logical criteria are lacking.

Both evaluators and researchers should be selected from among the most intelligent products of undergraduate education. The notion that researchers should be more intelligent (in the Graduate Record Examination sense, say) than evaluators is an entirely unjustifiable and repugnant value judgment. Maturity and teaching or comparable educational experience is not irrelevant in the selection of evaluation trainees, though neither should be overstressed. The irrational imposition of these criteria in the selection of educational researchers works against securing the best candidates. The pattern of interests and values most conducive to success as an evaluator may occur at a slightly greater rate among the graduates of professional colleges (engineering, education, etc.) than among the graduates of liberal arts curricula. Conversely, there may be some coincidence between an undergraduate liberal arts major and an attraction to the life of uninterrupted scholarship so essential to the researcher in any field and so rare.

The Relationship Between Educational Research and Evaluation: A Summary

Evaluation borrows inquiry techniques and a knowledge base for recognizing value from research and contributes little in return. Methodological research in the social sciences produces the technology of data collection and analysis that are so important to empirical educational evaluation. In addition, knowledge produced by basic research is often critical in determining whether a particular finding from an evaluative study should count as good or bad. For example, the evaluative meaning given to the finding that a health curriculum decreased the incidence of cigarette smoking among teenagers derives from extensive medical research which established a causal link between cigarette smoking and cancer and coronary disease.

The view of the relationship between research and evaluation presented here is a parasitic one; others such as Suchman (1967) see the two living symbiotically:

> "To some extent evaluative research may offer a bridge between "pure" and "applied" research. Evaluation may be viewed as a field test of the validity of cause-effect hypotheses in basic science whether these be in the field of biology (i.e., medicine) or sociology (i.e., social work). Action programs in any professional field should be based upon the best available scientific knowledge and theory of that field. As such, evaluations of the success or failure of these programs are intimately tied to the proof or disproof of such knowledge. Since such a knowledge base is the foundation of any action program, the evaluation research worker who approaches his task in the spirit of testing some theoretical proposition rather than a set of administrative practices will in the long run make the most significant contribution to the program development" [p. 1970].

Our entire discussion of the distinction between research and evaluation (and the relationship between research and development developed later in this paper) runs counter to Suchman's vision of the same relationship. Suchman saw "action programs" as based on scientific knowledge and theory; we see a more tenuous link between (a) what can be conceived of abstractly and established empirically in the laboratory and (b) what can be implemented in the field. There can hardly be said to exist an "intimate" connection between the success of a program in the field and some theory or hypothesis from a basic discipline.

The course of most basic research leads it further away from the possibility of influencing practice directly. Basic research seems to be characterized by a succession of studies in which greater control ("control" in the sense of the ability to manipulate specific components of independent variables) is exercised at each stage so that relationships among variables can be more precisely determined (witness the course of learning psychology from the Law of Effect through complex unravelings of the nature of reward, the function of drive states, secondary reinforcement, etc.). The control required to achieve theoretical understanding (e.g., the necessity to employ nonsense syllables in much research on memory and learning) leads to the "lack of relevance" of basic research so widely decried by practitioners. The practitioner's disappointment in the "irrelevance" of basic research is matched by the researcher's dismay at testing any "theoretical proposition" in the welter of uncontrolled variables that exists in even the simplest "action program."

The Relationship of Development to Educational Research and Evaluation

The dependence of development upon sophisticated evaluation techniques is obvious; indeed, development was earlier defined as consisting of production and testing of various educational products. That this critical component of development--evaluation--is often omitted from the development process is clear; the field of education is replete with examples of random adoption of faddish, untested innovations. In such cases, the process of development is incomplete and, by rights, those who promulgate such innovations (whether the motivation is profit, notoriety, or sincere belief) should be viewed as skeptically as the sideshow barker and other species of huckster. The need for careful and thorough evaluation (call it field study, product testing, or whatever) as a part of the process of development is well established; the fact that this relationship is so plain as to appear simplistic should not deter us from devoting serious attention to seeing that it is implemented in practice.

The relationship of development to educational research is more complex. This may lie partly in the fact that current conceptions of educational development (including our own) are still in the formative stages,[12] making the identification of relationships with other activities very difficult.[13] The complexity is increased by the fact that temporal relationships between research and development are not as clear as sometimes supposed.

The implications of scientific knowledge from basic research for educational development depend on the generality of the former. The most useful scientific laws are those of physics, most of which are learned firsthand and nearly unconsciously early in life by everyone. These basic physical laws are nearly perfectly generalizable; within human experiences there is no evidence that they have ever been suspended on the surface of the earth at any time in history. An astronaut in his spaceship experiences the repeal of certain physical laws and must laboriously learn a new set. By contrast, the laws of the social and behavioral sciences are of extremely limited generality. The facts (and their scarcity) made the ready application of social science knowledge to education extremely difficult. Social scientific laws are little more than probability statements about the tendency of one variable to be related to another. These laws are highly interactive with factors such as geography, time, cultures, and individual characteristics. The most comprehensive and sophisticated behavioral theory of the last 100 years seems to continue to lose validity as mankind moves further from the society of sexually repressed, 19th century Viennese hysterics toward the contemporary model patient, the compulsive neurotic. If physical laws were as limited in generality as the laws so far discovered about the social system, we would hesitantly creep out of bed each morning not knowing whether we would float to the ceiling or crash to the floor.

If basic scientific knowledge from educational research cannot be directly applied to educational development, how then are basic and practical knowledge related? There are two views on the problem: the metaphoric and the heuristic.

One position that is gaining advocates is that the lawful relationships discovered in basic inquiry serve as metaphors in the minds of schoolmen for the reality of education. This is the conception of the relationship between conclusion-oriented and decision-oriented inquiry advanced by Cronbach and Suppes (1969) and Jacob Getzels in an address delivered at the Annual Meeting of the American Educational Research Association in February 1969. Getzels argued that research may have the greatest effect on education not so much when it attempts to alter the elements of classroom practice directly as indirectly when it contributes to transformations in the general paradigms and conceptions of the human being (AERA, 1969). The metaphoric view holds that the practice of education is determined largely by a "prevailing view" in the minds of schoolmen and the community which is a metaphor of systems of scientific knowledge in psychology, sociology, political science, etc. The scientific knowledge and the folk knowledge are loosely related; the one system is only a metaphor of the other. The paths through which basic knowledge affects the prevailing view are not well understood, but they surely include mass media, textbooks, journalistic writing, and the oral tradition of education.

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[12] In our opinion, the content and skills that comprise educational development will continue to depend upon appeals to authority until empirical investigations of the type currently being conducted under the Oregon Studies in Educational RDD&E and the research project of the AERA Task Force on Research Training are completed.

[13] Schutz, one of the leading thinkers and practitioners of development has recently noted that: "Educational development is at present in a state of conceptual deprivation" [1968, p. 3].

The metaphoric view of the relationship of basic research to practice is essentially the position described eloquently by Boulding (1956) in his book The Image: Knowledge in Life and Society, which is required reading for all workers in the knowledge industry. The metaphoric view is probably true as a description of how schoolmen have used scientific knowledge in the past. However, we cannot accept it as a necessity nor as a prescription for the relationship of educational research and development in the future.

Metaphors are too inexact to serve as reliable guides to practice. Where the truth of half of the metaphor is distorted in transmission to the prevailing view or where the scientific basis of the metaphor is technical or subtle, the chances are too great that scientific truth will lead metaphorically to practical error.

In addition, the lag time between the discovery of a fundamental fact and its inclusion in the prevailing view is intolerably long. It is sobering to realize that only a small fraction of the children in this country have ever studied under programmed instruction and that it will be decades before many teachers will have a rudimentary grasp of operant learning principles. Schoolmen's resistance to new knowledge contributes greatly to the lag time between discovery and application.

Finally, trusting the improvement of education to schoolmen's metaphoric interpretations of scientific knowledge is dangerous because of the way scientific knowledge grows. As basic inquiry in any area comes of age, the sophistication and complexity of the knowledge produced increases. Doubtless, no physical law discovered in the last 60 years has affected the way we use physical knowledge daily. Chemistry no longer speaks to layman and the audience for the findings of experimental psychology is dwindling. As a science grows it becomes more complex, more subtle, and less able to influence the "prevailing view" (or, in the present case, less able to influence educational development). Witness the fact that in the early days Thorndike, Thurstone, and others were able to apply mental test theory directly in test construction; but, recent research in psychometrics is increasingly less immediately applicable.

Consider the example of laterality ("handedness") and learning difficulties. Until recently in this country (and currently in parts of Ireland), children were punished for writing with their left hand.

Ancient prejudices against left-handedness (e.g., the literal meaning of the Latin word "sinister" is "left-handed") and a resulting tendency for teachers to ascribe the learning failures of left-handed pupils to their laterality instead of stupidity or poor instruction supported the prevailing view in schoolmen's minds that pupils should learn to write with their right hand. The research which shows no relationship between laterality and learning problems is now more than 30 years old; but it is written in a technical language few schoolmen understand.

The lag time, the opportunity for misinterpretation, and the divergence of scientific and popular images make the metaphoric use of educational knowledge by schoolmen an inefficient and dubious activity.

Fundamental knowledge might better be regarded as having a heuristic relationship to educational development. The word heuristic is used here in the literal sense, namely suggesting or stimulating empirical research. The impact of basic educational research will be more immediate and reliable if educational researchers regard each new finding as a stimulus to a developmental-evaluative (and, perhaps, an applied research) effort.[14] Basic knowledge will never prescribe a particular development, but it will stimulate creative minds who understand the basic knowledge to develop materials and practices based loosely on it. If the innovation is developed and evaluated with the best empirical methods of evaluation and applied research, the payoff from basic research can be realized more quickly at a fuller value.

One of the more interesting areas of basic inquiry in education in the last 10 years is the work of Rothkopf, Frase, Anderson, and others on "mathemagenic" behavior, in particular the control of attention. These researchers have demonstrated the striking effects on learning of the control of attention through prompts in programmed instruction and adjunct questions in textual materials. On the latter question, it has been demonstrated that questions preceding paragraphs to be read cue the learner's attention to the answers to the questions and away from incidental material. Postparagraph questions cannot cue specific passages in a paragraph, and thus result in greater acquisition of information. In programmed instruction, overprompting of stimulus and response in associative learning has been shown to cause inattention to the stimulus-response pairing, resulting in poor learning.

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[14] Here, we seem to come full cycle. Development might be seen as drawing heuristically on basic inquiry. However, it also leads logically to applied research in that the nature of the product being tested may well result in a level of generalizable findings more relevant to applied research than to the typical evaluation study. For example, field testing Copper Valley School District's newly-developed, space-related science curriculum is clearly an evaluation activity; generalizability of the evaluation findings across time, geography, and to related phenomena are of little interest. Conversely, field testing the Far North Regional Educational Laboratories' newly-developed approach to teaching "mini-concepts" might be considered applied research in that the generalizability of the findings across geography, time, *and* to specific instances of the phenomenon are all of interest. Also, applied research may well supercede evaluation as products become more formalized and appear in semi-final form. Although evaluation studies are critical components of developmental research, the concern is typically with the single case or group under consideration, and unless evidence of the worth of a new procedure generated from a "single case" evaluation study is supported by replicable evidence, then support for the new procedure cannot be generalized except through appeals to authority. Thus, basic research might (very loosely) lead to development, which in turn necessitates evaluation and possibly further (applied) research.

The conclusions these researchers have reached concerning the cuing and control of attention are as well understood and lawful as basic educational research can hope for. Yet further work in this area has shown the facilitative effect to be highly interactive with such factors as positioning and pacing of questions or prompts, the difficulty of the material to be learned, the propinquity of question and answer, whether questions are general or specific, whether subjects can turn back in a text for review, habituation to adjunct questions, the motivation of the learner, amount of awards for learning, meaningfulness of material to be learned, immediate or delayed retention, and the mode (visual or auditory) of presentation of the material. The mathemagenic effect can appear and disappear as a function of these conditions. Obviously, then, simple prescriptions for curriculum development or instructional management cannot be made on the basis of these findings. The effective utilization of this basic knowledge without an intermediate applied research study would depend upon: (a) the developer's ability to recognize or measure such elusive characteristics of instructional materials and the conditions of their use as degree of meaningfulness, incentive-generating properties, and pupils' self-selected pacing and order of study; and, (b) the invocation of *ceteris paribus* in the hope that nothing will disturb the fragile basic relationship on which the developmental effort is based. It seems vain to hope that basic knowledge will be implemented without applied research and evaluation to test under special circumstances that which basic research only suggests may be true. This point was made in the following somewhat murky statement of Merton (1949):

> "(a) Every applied research must include some speculative inquiry into the role of diverse factors which can only be roughly assessed, not meticulously studied.
>
> (b) The validity of the concrete forecast depends upon the degree of (noncompensated) error in any phase of the total inquiry. The weakest links in the chain of applied research may typically consist of the estimates of contingent conditions under which the investigated variables will in fact operate.
>
> (c) To this degree, the recommendations for policy do not flow directly and exclusively from the research. Recommendations are the product of the research and the estimates of contingent conditions, these estimates not being of the same order of probability or precision as the more abstract interrelations examined in the research itself.

> (d) Such contingencies make for indeterminacy of the recommendations derived from the research and thus create a gap between research and policy" [p. 176].[15]

For some time to come, education is more likely to be improved through ingenious invention inspired by basic research and hard-headed evaluation of the inventions than by the direct application of the fruits of basic educational inquiry.

The Relationship of Diffusion to Other Inquiry-related Activities[16]

Diffusion is perhaps more clearly identified with "educational change" than is any other activity related to inquiry. To be sure, students of educational change take into consideration educational research, development, and evaluation; but, most of their attention has focused on diffusion processes. For many years, cultural anthropologists and rural sociologists were in the vanguard of thinking about change processes. Much of their interest was in diffusion rates of new ideas and practices in agriculture and among primitive peoples. Mort (1962) was among the first to study diffusion rates of practical inventions in education. In recent years, persons in many other disciplines (e.g., industry and the military) have pursued inquiry in this area. Havelock and Guskin's (1969) comprehensive review of literature on knowledge utilization processes is evidence that an impressive body of literature is accumulating in this field. However, despite the array of information that can be martialed in support of the importance of diffusion activities, two problems remain. First, the agrarian model of the change process is pervasive to the point where it is often inappropriately applied in contexts quite different from that in which it was developed and should be used. Second, a majority of our knowledge about diffusion stems from position statements of authorities in the field. The relatively small number of studies in this area seem to focus either on (a) surveys of opinions about diffusion processes, innovations, etc., or (b) studies of the rate of diffusion of various inventions and products. As a result, there exists a fair amount of knowledge about how fast diffusion occurs and what barriers often impede it; but, precious little is known about how diffusion actually occurs, or what specific knowledge and skills are essential for adequate performance of diffusion roles. This is especially troubling in view of the current pressure to train large numbers of diffusion personnel to serve "linkage" roles in education. Urging such training seems presumptuous in the absence of evidence that such efforts would in fact help to "bridge the gap" between research and practice (we will return to develop this point more fully later in this paper). Persons responsible for major decisions regarding allocation of funds for training inquiry-related personnel might wisely defer any sizable investments in training diffusers until more is known about the role they are expected to play.

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[15] This quote is an excellent synopsis of several of the points made in this section. However, it would be a distortion of Merton's overall position on the relationship between "pure" and "applied" research to imply that the position taken here and presented earlier by the authors (in the section on the relationship of research to evaluation) coincides with Merton's. Here we have argued for a much looser link between research and development than does Merton. Earlier we presented nearly the opposite view on the relationship between research and evaluation from what Merton advanced (1949, p. 179).

[16] Diffusion, development, evaluation, and research are all obviously related in that each activity can be applied to the others. One can do research on diffusion, development, or evaluation processes. Similarly, one can (a) evaluate research, development, and diffusion, (b) develop materials to train evaluators, diffusers, and researchers, and (c) diffuse the results of research, development, and evaluation activities. We find such relationships obvious and conceptually barren and apologize for building this section around the relationships listed in "c" above. However, diffusion seems to us to be a special case that is related to the other activities in only this way: we reiterate that we do not see it as an inquiry activity per se. The more meaningful interrelationships that appear among the other activities (e.g., the areas of overlap in Figure 3) simply are lacking when diffusion is considered.

Diffusion of Research Knowledge

Science could not long function without adequate exchange among scientists of information resulting from research activities.[17] Indeed, the exchange of knowledge is directly related to the raison d'etre of research--the production of new knowledge. Research is interdependent and incremental in that every study is related to and builds upon extant knowledge; this relationship cannot exist unless there is efficient diffusion of research findings among members of scientific communities.

Traditional models of diffusion of research (e.g., journal articles and papers read at formal conferences) are woefully ineffective, and new information exchange systems (e.g., ERIC) have proved disappointing to date. Efforts to develop more effective mechanisms to disseminate scientific knowledge should be encouraged;[18] perhaps the day will come when one no longer learns most of what he knows about new developments in his field through informal and haphazard contacts with colleagues.

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[17] The deplorable time lags and inefficient mechanisms currently in use in relation to at least "educational science" suggests that either the position above is overstated or educational science is functioning marginally, if at all.

[18] Perhaps one promising model is that proposed by the American Psychological Association in their new Experimental Publication System which features reviews of manuscripts within two days of receipt and distribution to all subscribers in topical areas within 65 days of the receipt of manuscripts.

Support for more effective ways to disseminate scientific knowledge does not imply support for disseminating a greater bulk of information. The authors agree with Michael's (1963) statement that: "Probably, on the average, only 10 percent of published papers in educational journals are worthy of being reported in the Review [of Educational Research]" [p. 443]. Scriven (1960) also set the figure as low as 10%. The overburden of useless information resulting from poor research caused Asher (1969) to argue that research utilization should include not only development, dissemination, and adoption, but also an elimination function by which the profession could rid itself of such static in the communications system. We do not intend here to explore ways to identify and exclude knowledge that is not worth disseminating, but it is obvious that solving this problem would facilitate better storage, retrieval, and dissemination of valuable knowledge.

Diffusion of Evaluation Findings

Diffusion plays a limited role in evaluation since evaluation findings and recommendations based on those findings must be disseminated to clients, constituents, etc. However, dissemination of this type is purely local in nature and is likely to be specific to each combination of setting and type of evaluation. Diffusion of evaluation findings could be best performed in most instances by the evaluator or his staff, with the help of communications consultants when necessary.

Diffusion of Products of Development

The most widely discussed role of diffusion in education is in facilitating application of the materials, devices, systems, or methods produced through educational development activities. This type of diffusion differs from those discussed above in two ways. First, it includes all three processes subsumed under diffusion--dissemination, demonstration, and facilitating adoption. Diffusion of research and evaluation findings is concerned only with dissemination of knowledge or information. Second, exchange of money is much more relevant in diffusion of developed products than it is in pure diffusion of knowledge. The importance of this distinction will be expanded later in this paper.

Toward More Useful Implementation of Educational Research, Development, Evaluation, and Diffusion

So far, we have discussed research, evaluation, development, and diffusion in abstract terms, with little regard for the realities of how these activities are initiated, organized, and supported. In this section we shall discuss federal policy regarding educational research and then address the problems of organizing research, development, diffusion, and evaluation so that they become more potent forces in shaping the nature of schooling.

Federal Research and Development Policy

Attempting to identify trends in federal policy regarding educational research and development may be premature, particularly since for the next few years that policy is likely to originate in the terra incognita of the National Institute of Education.

The federal government is currently the single largest source of funds for educational research and development. The policy of the disbursing agencies appears to be that educational research (both basic and applied) and development can best be pursued within universities (including R&D centers) and other public, nonprofit agencies (e.g., regional laboratories). Two cautions should be raised concerning such policy: (a) it runs counter to the organization of applied research and development in the nation; and, (b) it threatens to subvert the unique contribution which the universities can make to the production and distribution of knowledge through basic research.

Although in recent years the majority of funds for research and development in all fields has been disbursed by the federal government, the universities have been the largest user of funds for basic research, and industry has been the largest user of funds for applied research and development (see Tables 1 and 2). For example, in 1968-69, 64% of all funds spent on applied research and development were spent by private industry. Only 2% of the funds for applied research and development were spent in universities. At the same time, most applied research and development in education was being conducted in universities. If applied research and development in other fields are conducted largely within private industry, why should applied research and development in education be conducted in universities? Whether one regards current allocation patterns with shock or with approbation ultimately goes to the heart of his social-political philosophy. The conservative frame of mind pauses to search out the wisdom--if there is any--in the established order. Policy-makers should do no less in thinking through the problems of organizing educational research and development.

There appear to be few reasons to doubt that basic research will continue to emanate primarily from the universities. These institutions are designed for the discovery of new knowledge and the training of the next generation of discoverers. A case can also be made for applied research being conducted in universities, although much of it might quite appropriately be left to industry. On balance, the success of universities in development work is more equivocal. In some cases (e.g., government sponsored work for the military) development has been disruptive of the business of the universities. Scholars have been removed from their research pursuits in many instances and their services as teachers of both undergraduate and graduate students have been lost, far more so at the undergraduate level.

Research

Greater payoff can be realized from educational research to the extent that: (a) it adopts more of the perspectives afforded by all of the social sciences (not just psychology); (b) its relationship to

TABLE 1

Funds for Applied Research and Development in the United States Classified by Source

Fiscal Year	Source of Funds				Totals	Users of Funds			
	Federal government	Industry	Universities	Other		Federal government	Industry	Universities	Other
1953-54*	2,545[1] (54%)	2,093 (44%)	68 (1%)	12 (0%)	4,718 (100%)	923 (20%)	3,479 (74%)	242 (5%)	74 (2%)
1957-58*	5,957 (65%)	3,141 (34%)	79 (1%)	18 (0%)	9,195 (100%)	1,329 (14%)	7,388 (80%)	383 (4%)	90 (1%)
1968-69*					13,701 (100%)	3,100 (23%)	8,784 (64%)	1,188 (9%)	630 (5%)

Note: Use for 1953-54, 1957-58 and 1968-69 Adapted from Tables V-1 and V-4 in Machlup (1962) and from National Science Foundation (1969).

*N.B.: Data streams have been crossed in going from fiscal years 1954 and 1958 (Machlup) to fiscal year 1969 (NSF). Thus it is hazardous to infer any more from these data than a general pattern.

[1] All figures represent millions of dollars.

TABLE 2

Funds for Basic Research in the United States Classified by Source and Use

Fiscal Year	Sources of Funds				Totals	Users of Funds			
	Federal government	Industry	Universities	Other		Federal government	Industry	Universities	Other
1953-54*	195[1] (45%)	147 (34%)	62 (14%)	28 (7%)	432 (100%)	47 (11%)	151 (35%)	208 (48%)	26 (6%)
1957-58*	423 (51%)	249 (30%)	111 (13%)	52 (6%)	835 (100%)	111 (13%)	272 (33%)	392 (47%)	60 (7%)
1968-69*					2,146 (100%)	547 (25%)	390 (18%)	1,074 (50%)	135 (6%)

Note: 1953-54, 1957-58 and 1968-69 Adapted from Table V-1 in Machlup (1962) and from National Science Foundation (1969).

*N.B.: Data streams have been crossed in going from fiscal years 1954 and 1958 (Machlup) to fiscal year 1969 (NSF). Thus it is hazardous to infer any more from these data than a general pattern.

[1] All figures represent millions of dollars.

practical problems of development is examined critically; and, (c) it is given financial support. Each of these considerations is discussed briefly below:

Interdisciplinary research. Making educational research multidisciplinary is the new shibboleth of the research community. The slogan is proper and we support it with few reservations. The problem and prospects have been discussed in detail elsewhere (Glass, 1968) and, in the interest of brevity, will not be repeated here.

Relationship of research to development. In an earlier section of this paper, a view was presented of the relationship of research and development in which development took its direction from basic research. (The view could be characterized as the "development-catches-crumbs-from-the-table-of-research" model.) Other conceptualizations of the relationship of research to development are possible and, to some extent, defensible. Scriven (1969, pp. 18-21) argued that:

> "It is . . . much better to move into theory exactly where and only when obliged to by the combination of data and needs that define our task. Speculation in the absence of a clarification of these parameters is too often merely idle, the kind of irresponsible gambling with society's resources that is lauded in cheap histories of science and was once a rich amateur's prerogative" [p. 19].
>
> ". . . the selection of problems for research should be much more closely guided by considerations of practical needs and advantages" [p. 20].

Scriven's remarks were made in the context of a discussion of pure and applied research in psychology.

Space does not permit our going deeply into the problem of the "power structure" among research, development, and evaluation. This power structure, with its order of dominance (who tells whom what to do?), is no less important than the professional reward structure discussed later in this paper.

The view suggested here of development leading research is at odds with the earlier view of research leading development. The two views are obviously contradictory, and we are incapable of resolving the contradiction. Indeed, it seems only honest and sensible to acknowledge the uncertainty that causes us to present the two contradictory views without pretending to know to which one we should subscribe. ("I contradict myself? Very well, I contradict myself."--Walt Whitman)

Financial support. Finally, more money spent on educational research and the training of researchers will result in more research and more knowledge. Such a commonplace would hardly seem necessary to state were it not that there are signs that allocation policies are being framed and implemented in the belief that decreased support for educational research will cause neither a decrease in the number of persons trained to do research nor in the knowledge they discover.

Evaluation

The single most important impediment to the effective utilization of educational evaluation talent and expertise is the reward structure within universities. The scholarly activities encouraged and rewarded by the university promotion policies are more research than evaluation. Few persons have the professional security to buck the system and endanger their futures in the academic world.

The power of the professional reward structure to enforce conformity to traditional research was observed at a recent meeting of the Society for Applied Anthropology. At a session on anthropological approaches to educational development and evaluation, three anthropologists recounted their genuinely exciting experiences in building and assessing special educational programs for various American Indian tribes. During an open discussion following the presentations, a senior member of the discipline rose to reaffirm that "anthropology is the disinterested study of mankind" and that his colleagues' work saddened him because it represented the prostitution of a noble science. The threat in his remarks was evident even to an outsider. He was calling his errant colleagues to return, and if they did not, they would lose their identity as anthropologists. The accused attempted to defend themselves, but inappropriately. They sought to justify their involvement in applied problems in education on the grounds that their experiences were making them more knowledgeable anthropologists and that basic knowledge about anthropology would be the ultimate result of their labors. To the outsider, they appeared to give the wrong reason for doing the right thing. First, development and evaluation will probably contribute very little to basic knowledge in any of the social sciences; unfulfilled expectations and a reaction against development and evaluation are the likely consequences of justifying evaluation on its "fall-out" for basic research. Evaluators must be careful not to promise too much, particularly as regards the basic knowledge likely to result from their efforts. Secondly, that billions of dollars are spent yearly on education and that human welfare has some relationship to the activity are reasons enough that more than a handful of social scientists should become involved in development and evaluation. If basic anthropology never gained one iota of knowledge from the efforts of 10% of all anthropologists working in behalf of educational improvement, society would probably be none the worse off.

The traditional reward structure in the university and in a field of scholarship is based ostensibly on teaching (which is usually assessed on the basis of heresay evidence from students), service (which is seldom public and thus seldom assessed at all), and research (which--in spite of our protestations to the contrary--can be measured as validly as is currently the practice by weighing a man's publications). Promotion within the university and prestige within the discipline depend almost entirely on a man's published works. (We are not prepared to take the final step in cynicism and argue that the length of a scientist's publication list is uncorrelated with his contribution to the discovery of knowledge. Science is public--a "superculture" that spans the globe, in Boulding's words--and publication is essential to its growth.)

As was argued earlier in this paper, the results of an evaluation are of severely limited generality; the audience for the report is rarely very large. The consumers of an evaluation are seldom capable of appreciating the expertise which the evaluator lavishes on the project. One may show off to one's colleagues, but one must be humble and uncomplicated with one's clients. Thus evaluation does not offer the opportunities for publication that the researcher enjoys. As long as promotion and prestige are tied to publication, the professional reward structure will militate against involvement in evaluation in favor of traditional patterns of research.

There is probably a greater chance of successfully creating new institutions which are alternatives to the universities and which have different reward structures than of altering the existing reward structures of the universities and scientific disciplines. (There are good reasons for not tampering with the organization of the universities to give greater emphasis to evaluation. These reasons will be examined in a later section on the implementation of development where they apply with more force.) The RAND Corporation is the preeminent example of an institution which has sustained research of an applied sort, much of it classified and thus unpublishable. Such institutions can be successful in rewarding accomplishments of a type that go unrecognized in the larger profession. Such alternative institutions perform a function far more significant than is generally credited them. They represent the most promising mechanism for bringing evaluation into education.

Development and Diffusion

These two inquiry-related activities will be dealt with together because we shall propose a common solution to the problem of increasing their impact on education.

As was implied earlier, the growth of writings on educational diffusion ("change agents," "linkage agents," etc.) has been proliferative and is in need of a loyal opposition. Nearly all thinking about diffusion begins with the same premise: a new role (institution or organization) must be created to effect change in the schools. As Rankin and Blanke (1968) noted:

> "Two assumptions re-occur frequently in the literature on educational change: (1) there is a large gap between theory and practice, and (2) special organizations must be created and individuals trained to bridge this gap if educational improvement is to be consistent, effective, and efficient" [p. 1].

To our knowledge, alternative assumptions have not been examined seriously; all thinking has been directed toward delineating the functions of this new role, the disseminator. In our opinion, the major impediment to change in the schools is probably *not* the absence of an agent to diffuse educational developments and thereby link the the classroom to the R&D center.

Most writing in the educational literature about diffusers is based more or less on the "county-agent" model from agriculture. However, schools are not farms (as is obvious), and the important respect in which they differ is the nub of the problem of getting the former to change. The farmer participates in an exchange economy and much of his behavior is under the control of the market. The county agent has been instrumental in improving the productivity of agriculture, but his role tends to be overemphasized by educationists who are also prone to minimize the roles played by farm implement salesmen, the motivating effects of the marketplace itself, and even the negative effects of "cooperatives" and subsidy programs. The schoolman works in what has been called a "grants economy," and his behavior is accordingly quite different from the farmer's.

Boulding (1970) analyzed the predominant economic relationships among men and organizations and the implications of these relationships for behavior. The traditional market is based on an *exchange relationship*: A gives something to B, and B gives something of equal value to A. Feedback on whether the exchange has produced a net gain for both A and B is immediate. Allowed to function long enough, the market based on this simple exchange relationship insures the continued welfare of both A and B. The "market economy" is organized around this simple act of exchanging. A second important relationship is *integrative* (Boulding, 1970). In an integrative relationship A gives something to B because he likes him, is concerned about B's welfare, because posterity will benefit, etc. A does not expect feedback from B; indeed to expect it is at cross-purposes to the altruistic nature of the relationship. The integrative relationship is the basis for what Boulding has called the "grants economy." The grants economy is that sector of the economy which involves the granting of money from one person (or organization) to another. The bulk of the grants economy is in the public sector though private philanthropy is by no means negligible. In large part, governments act as the granters, spending tax dollars on public works such as welfare, defense, police protection, and schooling.

The grants economy, which is estimated to have risen from about 3% of the Gross National Product (GNP) in 1900 to approximately 13% of the GNP today (Boulding, 1968), will face hard times over the next few decades:

> "We now seem to have reached the point where strong tax resistance has developed in American society, which is a symptom of the fact that the public grants economy has been stretched to the point where the sense of community, both local and national, will not support much expansion of it. We see this

> in the failure of millage increases, and school bonds in local elections . . . Under these circumstances, the assumption that the grants sector of the economy can be indefinitely expanded is quite unrealistic. This fact is of crucial importance to the educational industry, which depends so much on the grants sector of the economy. We may be facing a real disaster if the expansion of the educational industry, which is so clearly required by the dynamics of the society, cannot be financed because of the limits on the grants economy" [p. 369].

The percentage of the GNP expended on public elementary and secondary education in the United States is depicted in Figure 6. The percentage of the GNP involved in education (public and private) at all levels has grown from 3% in 1900 to 7% in 1970. It is clear that education is becoming increasingly expensive as are all areas of the grants economy in this century. As in the case of local police (which, heedless of the bumper stickers, the public is not supporting financially), the ultimate result of increasing expenditures of public dollars is a clamping down on grants. Education may face this prospect for several years to come. This possibility should make planners leary of creating new roles and staffing them at public expense, particularly if the roles are nebulous and their value still to be demonstrated. One disseminator or change agent for each public school district in the nation would increase expenditures for schooling by 1% (20,000 disseminators X $15,000/disseminator = $0.3 billion, which was 1% of the $31.5 billion expenditure for public elementary and secondary education in 1967). Such proposals must be scrutinized carefully in an age when all manner of educational reformers can be found who wish to enrich education at public expense.

In this context, a relevant question is whether many development and diffusion activities can be performed efficiently by educationists in any event. Bureaucracies are notoriously ineffective in producing or nurturing change (**Thompson**, 1965; **Merton**, 1950) and most educational institutions exhibit many characteristics of classic definitions of bureaucracy. In other highly bureaucratized sectors of the grants economy an incapacity to engage extensively in development and diffusion activities is apparent. Witness the military's subcontracting of virtually all work on developing transportation and weapons systems to private industries such as Boeing, Dow Chemical, and Sperry-Rand. In education, this incapacity has been denied and one finds many proponents of the "I'd rather do it myself" approach. Taking this position in the absence of any evidence that educationists either can or should assume major responsibility for educational development and diffusion seems to us to be ill-advised.

The net effect on educational practice of all the scholarly papers and conferences on educational change which could be produced, all of the laws Congress could pass, and all of the federal programs which could be mounted would be insignificant beside the impetus for change that would result from moving schooling out of the grants economy and under the influence of the market mechanism. Schooling and most educational

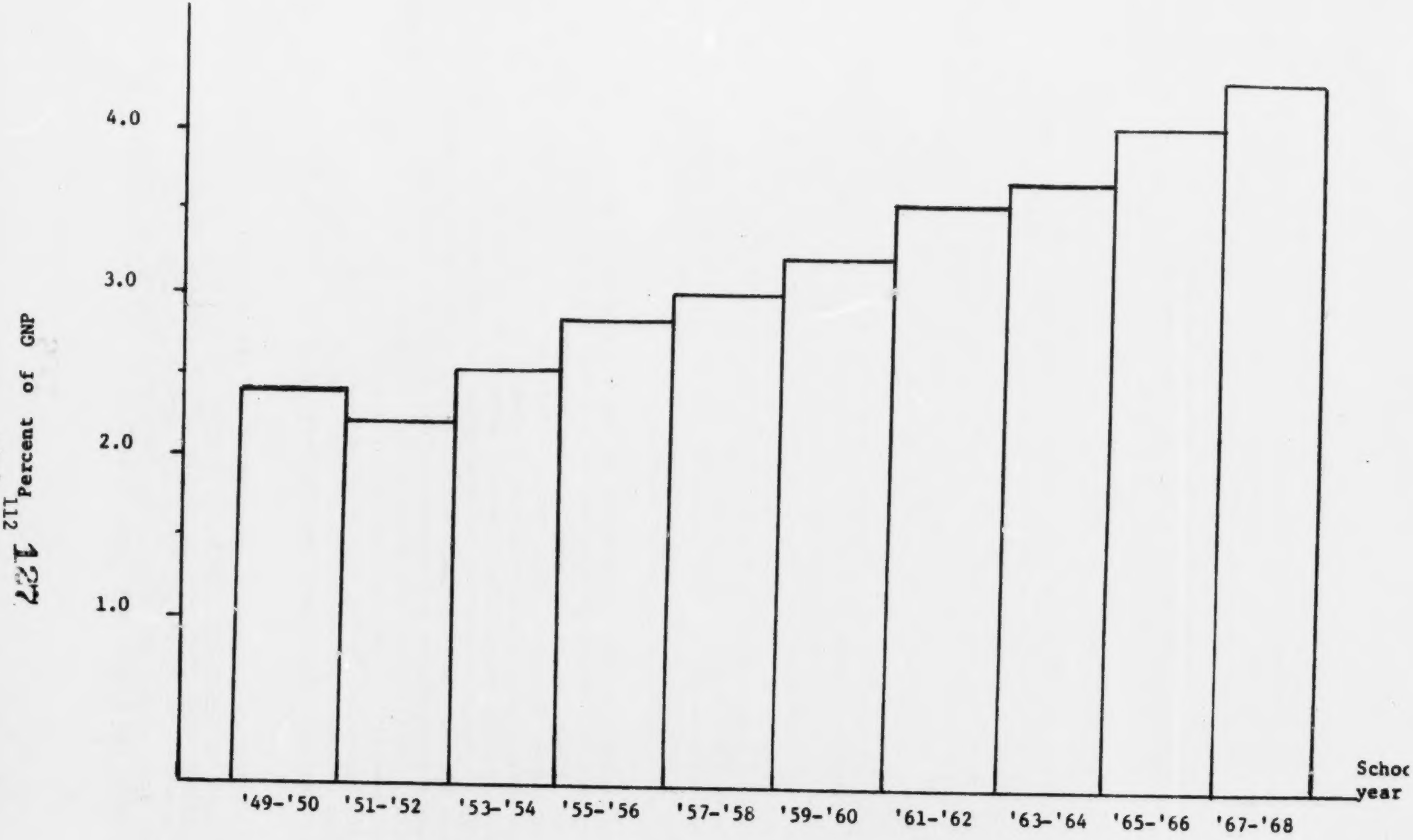

FIG. 6. Expenditures for public elementary and secondary education as a percentage of the gross national product. (Source: U.S. Department of Health, Education and Welfare, Office of Education, "Statistics of State School Systems.")

development and diffusion activities should be turned over to the private sector of the economy. There appears to be shockingly little faith in capitalism among the same schoolmen who regard the subject as a cornerstone of a good portion of the public-school civics and history curriculum. The knee-jerk bureaucratic response of passing a law or "mounting" a government program whenever a problem is encountered is wasteful and a potential failure as a means of promoting educational change. Government at all levels would be well advised to leave educational development and diffusion to private enterprise. That they intend not to is testimony to the singularly liberal failing of a lack of faith and patience in the market mechanism. In fact, the involvement of governments at all levels in schooling is one of the greatest impediments to the proper functioning of the market mechanism. In our opinion, moving schooling out of the grants economy into a market economy would cause educational development and diffusion to flourish.

We recognize that our recommendation has utopian overtones. However, the alternative of leaving educational development and diffusion largely to private industry must be given serious consideration. If no other reasons existed, the hard times facing the grants economy are reason enough not to place additional economic strain on public support for education until and unless it can be demonstrated that there is no alternative way to bring about educational improvement.

There are some development and diffusion activities for which educationists might properly assume responsibility; but, these represent a relatively small portion of the whole spectrum of diffusion and development functions. For example, the dissemination of scientific knowledge in education might appropriately be considered an inquiry-related activity to which educationists should give attention.[19] Encouraging utilization of scientific information is a fragile undertaking that might be destroyed by the imposition of charges for information that would be necessary if the endeavor were relegated to profit-making organizations. Costs for information might discourage the use of information sources, however efficient.[20] Dissemination of scientific knowledge should be nurtured, at public expense. It is here that we see further thought about diffusion profitable for the field of education.

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[19] We include under the rubric "scientific knowledge in education" not only results of basic research, but also products of development that meet two criteria: (a) they have been thoroughly tested through evaluation and applied research studies and found to be of worth, and (b) they cannot readily be used for profit-making by private industry. For example, if a particular pattern of staff utilization had been developed and shown through applied research to produce salutary effects on student achievement, it might well fit here since a plan for staff utilization is hardly a commodity that could be copyrighted or marketed by private industry. Thus, dissemination of information about this type of "product" would be the responsibility of "educational disseminators."

[20] The thesis is developed elsewhere (Glass, 1969) that educational information is a highly elastic commodity--in the economic sense; when its cost in time and inconvenience rises above a minimal level, the schoolman gladly substitutes folklore and tradition for it. Also see Stake (1967b) from whom these ideas were taken.

Diffusion of developed products that are marketable (e.g., curriculum materials, audio-visual devices, computer programs, technological advances) demands far more personnel and financial resources for dissemination, demonstration, and assistance with adoption than does the simple dissemination of knowledge discussed above. It is this former type of diffusion--the major portion of the whole--that should be moved from the grants economy to the private sector.

There is evidence that much of the talent for developing educational materials, especially curriculum materials, exists in universities, regional laboratories, and other educational settings. Productive efforts of many curriculum development projects (e.g., PSSC, BSCS) are well known and it is questionable whether private industry would expend the large sums necessary to develop similar materials that might be viewed as "high risk" in the profit-making sense. Certainly some public subsidies for such high-risk development ventures will be necessary, but they will demand considerably less resources and energy than the development of most educational hardware and software. By excluding this type of development which private enterprise is equipped and willing to assume, the burden on public expenses for schooling could be reduced and efficiency could be increased.

Trends Toward the Private Sector

The motivation for developing and disseminating educational products must originate with schoolmen. The motivation is lacking as long as schoolmen are spared the obligation to maintain a market relationship with the public. Any idea about education in the 1970's worth proposing has had previous advocates. We have no priority claim on the concept of an open market in schooling. Friedman (1970) adumbrated a plan for instituting the market mechanism in higher education. Boulding (1968) advocated more moderate reform of higher education than Friedman, though his intention was similarly to move schooling more toward an open market. Levin (1968) examined arguments on both sides of the open-market question and called for experimentation to resolve the uncertainties in the various proposals. (Also see Carr and Hayward, 1970.)

In the fall of 1972, the Office of Economic Opportunity will instigate an experimental "voucher plan" in one or two communities. Parents will be offered vouchers equal to the per-pupil expenditure for schooling in their community; the vouchers can be used to pay for the education of their child in any school in the community: public, private, or parochial. Another hopeful sign of change, which will have to proceed cautiously to avoid being destroyed by overstimulated expectations and unsubstantiated claims, is contract schooling or "selling grade levels." The initiative in this area has been taken by private firms such as the Educational Developmental Laboratories of Long Island, New York, and the Behavioral Research Laboratories of Palo Alto, California.

One of the more propitious occurrences in educational development of the last few years is the recent decision of the U. S. Office of Education to reverse the policy of public domain rights on educational developments resulting from government supported research and development. The current plan to permit USOE sponsored research and development agencies to receive one-half of all royalties from the marketing of their development promises to stimulate a great deal of worthwhile effort. The biggest mistake which the R&D agencies could make would be to plow all of the profits back into the enterprise and thus weaken the profit motive in individual workers.

Computer-assisted instruction is currently an underdeveloped area, at least the software side. The dearth of instructional materials for CAI could be related to problems of authors' achieving wide dissemination of their product while protecting copyrights. The most hopeful proposal for stimulating CAI development is large time-sharing computer systems among universities in which authors are paid royalties for the use of their instructional programs much as actors are given "residuals" for repeats of their television performances.

Problems with the Market Mechanism in Education

The market mechanism works so poorly in education today because schoolmen do not participate in a market relationship. Funds are granted to them, and they are not required to present feedback to the grantor (in this case, the public) as evidence of how well the funds are being spent. No genuine exchange relationship can be established where one party is not accountable to the other. The first step toward instituting the market mechanism in education is to complete the feedback loop from the school to the public, to make the schoolman accountable for his successes and failures. To base education on an exchange relationship between the public and the schools would create a high demand for educational development, evaluation, and diffusion. Much of the literature and planning for diffusion proceeds from the premise that the lack of progress is attributable to deficiencies in the supply side of the market. However, the lack of progress in educational diffusion is a result of a nonexistent demand.

The sluggishness of the market for educational development is often attributed to the suppliers instead of those who control demand. In a study of the educational products industries by the Institute for Educational Development, the following conclusion was reached (quoted from Educational Research and Development in the United States, prepared by the Bureau of Research, U.S. Office of Education, July 1969):

> "IED (Institute for Educational Development) found that, with very few exceptions, company officials' perceptions of their role in the educational enterprise were quite limited and relatively passive. IED concluded that restricted and passive role perceptions appeared to limit the possibilities for research and development activities within the educational materials industries" [p. 250].

To our knowledge, no one has ever laid the blame for the disappearance of the kerosene lamp industry on the passivity or limited role perceptions of its officials.

One of the more significant phenomena with which textbook publishers must deal is the fact that approximately 13% of the market (representing the populations of Texas and California and not counting many large-city school districts) is completely closed; textbook adoptions in Texas and California are statewide. Although this may appear to create lively competition among publishers, the effective result of these markets being closed is to discourage innovation in the educational products industry. Publishers assess each new proposal for a textbook in terms of whether it will sell in Texas or California.

The difficulties with the proposal to base schooling on the market mechanism are the soft spots in every purely capitalistic system, namely the desire of the top dogs to eliminate competition through monopolies, trusts, cartels, etc., and to stifle feedback (criticism) concerning the consumer's satisfaction with the exchange. Instances of the former strategy abound in the history of this country. The corruption of the market mechanism is illustrated by such instances as the Consumers Union finding it impossible to purchase advertising space in leading newspapers for 15 years, the intrigue of Ralph Nader vs. General Motors, and the birth trauma of the Educational Products Information Exchange.[21]

Perhaps the open market in schooling could never remain uncorrupted by the educators' desire to eliminate competition. The Toronto, Ontario school system is believed by some outsiders to be an open market. It is alleged that parents may send their children to any school in the city, public or private, and that each school receives financial reimbursement from the city based on its enrollment. It is further claimed --by opponents of proposals recounted here--that this "open market" has resulted in a school system which is as traditional as any comparable system in the U. S. However, to the insider, it is apparent that the school officials in Toronto have so successfully deemphasized and tangled in bureaucracy the parents' right to freely choose schools that neighborhood schooling prevails almost without exception.

There are many reasons why a pure laissez-faire market in schooling might not be practical. The public could not tolerate periods of suspended services when one "firm" goes out of business. The long-run interests of all are served by educating all children, whether they can afford it or not. And so forth. There are many compromises with the ideal of an open market that could be instituted in education to protect the commonwealth. Loan programs administered through state or federal governments (or even through private enterprise) could be expanded at the college level and--come the millennium--extended down to the secondary and elementary school level.[22]

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[21] EPIE was reported to have been threatened with an injunction by audio-visual aids manufacturers in connection with a simple descriptive report on the features of the overhead projectors on the market (see School and University magazine, October 1967).

Similar considerations apply to problems of moving educational development and diffusion activities into the open market. There are several developmental activities that probably would not be conducted well by private industries. For example, in the drug industry, pharmaceutical research in the U. S. led to such advances in drug development that the European pharmaceutical market adopted U. S. developments almost directly. When the U. S. government placed ceilings on profits in drug manufacturing, the drug industry responded by curtailing research and development efforts, eventually moving full cycle and becoming dependent on developments in the European market. The results--including problems with Thalidomide and other drugs developed in other countries--were deleterious in many instances. The problem is that genuine altruism is rare, and research and development for the good of mankind is given short shrift when the margin of profit falls below a level acceptable to private enterprise. It is because of this problem that it was suggested earlier that certain development and diffusion functions must be retained by educationists.

Consumer Guidance

In one form or another, the Establishment response--the establishment of researchers, evaluators, and developers as well as schoolmen--to the proposal of market schooling is that the "parents do not know what's good for their children." As regards schooling the public cannot be trusted to act in their own best interest, the Establishment maintains. The argument that the educationist subculture harbors a set of values and goals for schooling which is manifestly superior to those of the nonprofessional community is singularly unconvincing. The current fashion in urban and compensatory education--community participation--is based on the antithetical premise that it is often better to let people make their own mistakes, even at the expense of their short-run gain. (The elitist is unwilling to forfeit the short-run gain, agreeing with Keynes that we'll all be dead in the long run.) The institution of the market mechanism in schooling would restore a precious freedom to the public, the right to be wrong. One of many plausible explanations (and quite likely a contributory cause) of the deplorable state of much of the public school system is that elitist educationists have so thoroughly protected the public from erring on its own behalf that they produced feelings of impotence and indifference. The freedom to choose necessarily entails the freedom to choose unwisely. But those very freedoms are vital if each man is to come to believe that his life counts for something in a society that is increasingly managed and programmed by an unresponsive mandarin class.

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[22] Professor Killingsworth of Michigan State University has proposed a system of federal banks which would loan money to any individual desiring a college education; the loan would be repaid through a surcharge on the individual's income tax.

At another level, the Establishment of researchers, evaluators, and developers might express similar concerns about whether or not schoolmen "know what is good for the children." Such a concern need not be interpreted as critical of schoolmen in particular but rather of the gullibility of consumers in general. The correlation between the volume and quality of advertising and the volume of sales (regardless of quality) is substantial enough to give pause to the thoughtful. The dollars expended on hair restoratives and glyphs are cases in point. Consumers are frighteningly susceptible to purchasing for many reasons unassociated with the real worth of the product; educators are not a breed apart.

Despite the fact that both parents and educators are likely on occasion to be mislead by hucksters, charlatans, or Madison Avenue, we do not endorse the position that either educators or the public must be "protected" against making wrong choices. Instead, we are optimistic that educational consumers can be educated to consume intelligently; the difficulty of choosing wisely should not be overemphasized.

In open market place, the public could be aided by agencies analogous to the recently formed, federally supported Consumer Guidance Commission. This commission was formed to identify and rate unreasonably hazardous household products. Products are not endorsed, but lists of those that should be modified or removed from the market are distributed. A similar strategy could be employed in education as a public service and, appropriately, at public expense. In this way, government could have a significant positive impact on the working of the market, thus producing salutary effects on the development and diffusion of educational products. The formation of EPIE was a step in the right direction; more vigorous steps will be needed. For example, agencies might be established to evaluate not only educational products but also assess the effectiveness of existing or newly proposed educational processes (e.g., organizational or staffing plans, and pedagogical techniques). Such agencies might, through systematic evaluative inquiry, make recommendations about the relative effectiveness of alternative educational processes under several types of conditions. Such recommendations, coupled with information generated by product evaluating agencies such as EPIE, would provide considerable help to schoolmen and the public in choosing wisely among the variety of processes and products they might use to educate their children.

It would be foolhardy to underestimate the practical problems of shifting schooling even a small distance on the grants-exchange economy continuum. Obviously the task falls to the experts in economics, school finance, and related fields. We wish only to support the notion in principle that the development and dissemination of educational products will proceed more rapidly and to greater effect if carried out in the private sector than if conducted in the network of universities and non-profit agencies established by current allocation policies.

Conclusion

Perhaps the best conclusion we could give is to state as succinctly as possible the general concerns with educational inquiry which formed the background for this paper:

1. There are probably more similarities than differences between research and evaluation. However, the similarities are generally well known and there is a danger that overemphasizing them at this time does a disservice to both researchers and evaluators. More is to be gained now from drawing distinctions among inquiry and inquiry-related activities than from emphasizing their commonality.

Our concern with definitions is not mere scholasticism, but rather an acknowledgement that the conceptions of types of inquiry guide behavior and determine to some extent the nature and success of these activities.

2. We cannot be confident of any recommendations about how research, evaluation, and development should be interrelated. We hope not to appear to be credulously accepting of the claim that development must follow basic and applied research; at the same time we realize the potential hazards of turning the relationship around so that basic researchers take their direction from evaluators and developers.

3. Support for basic research in education is threatened by a lack of faith in the long-range payoff of inquiries motivated by curiosity.

4. The full utilization of educational evaluation is impeded by the professional reward structure within educational research.

5. Development of educational products and their dissemination are impeded by the economic structure of the schools and not by a slothful and passive educational products industry. These activities should be conducted primarily in the private sector of the economy and not pursued by universities.

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A CRITIQUE OF THE PAPER

Paul D. Hood

Far West Laboratory for
Educational Research and Development

Two Perspectives: Inquiry and Practice

"Educational Inquiry and the Practice of Education" is in fact two essays. One deals with disciplined inquiry, the other with accountable practice. In the first essay the authors examine, from the academic perspective of "disciplined inquiry," the nature and relationships of four processes: research, evaluation, development, and diffusion. A content analysis shows that the major part of this essay deals with distinguishing "basic" research from "value oriented" outcome evaluation, both of which are depicted as falling entirely within the area of disciplined inquiry but differing in many characteristics. By contrast, less than one-fourth of the first essay deals with development, diffusion, or the relations of development and diffusion to each other, to research, or to evaluation. This highly disproportionate treatment among the four subject areas is possibly understood by examining their Figure 3, depicting the inquiry domain. Here, educational diffusion lies totally outside the area of disciplined inquiry and educational development is only partly within. Moreover, both diffusion and development are depicted as relatively small areas when compared to either educational research or educational evaluation. This apparently is the perspective of Glass and Worthen.

By contrast, if the perspective of educational change and improvement of practice is taken (instead of "language usage". . .), we might arrive at a substantially different view as in Figure 1.

In this figure, educational diffusion, development, evaluation, and applied research are all related to one another and are almost totally within the domain of concern for improvement of educational practice. On the other hand, "basic" research is a peripheral activity, relating to educational practice improvement primarily in terms of the relationship of basic research to applied educational research and to educational evaluation.

In view of the title of the Glass and Worthen paper, it is unfortunate that their diagrams regarding disciplined inquiry were not extended to include explicitly the domain of educational practice.

The Place of Applied Research

The reader may note that in Figure 1 basic and applied research are treated as separate but overlapping activities. Although Glass and Worthen have not entirely ignored applied research (see pp. 73-75; 99-101), they have given most of their attention to basic research. By

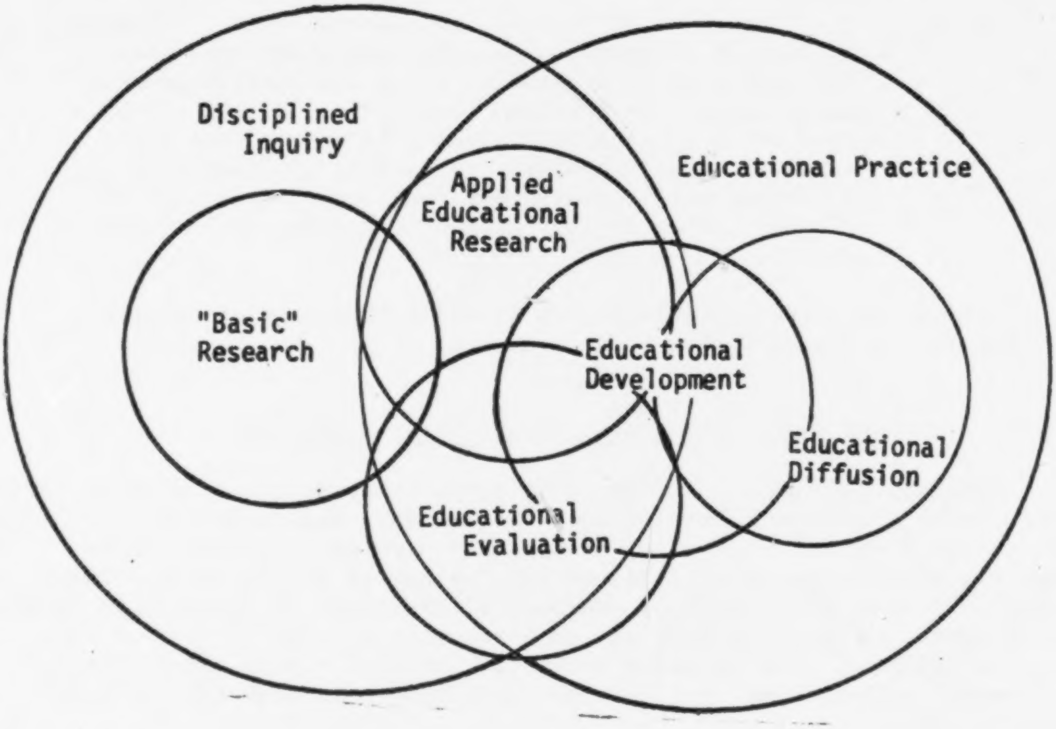
Disciplined Inquiry
Educational Practice
Applied Educational Research
"Basic" Research
Educational Development
Educational Diffusion
Educational Evaluation

FIG. 1. The inquiry domain and educational practice.

opposing basic research to one kind of evaluation,[1] the authors make a number of useful distinctions between these two rather well removed activities. But in so doing they have managed to skirt some important and conceptually more difficult areas. It is the nature of applied research, knowledge based development and diffusion, and evaluation, and their relationships that seem to pose our current conceptual problems, at least with respect to the improvement of educational practice.

Consider, for instance, the 10 characteristics of inquiry that the authors propose as a basis for distinguishing research from evaluation. Not all of these distinctions remain valid if we attempt to distinguish applied (rather than basic) research from evaluation, viz:

> 1. Motivation of the inquirer. ". . . evaluation is intended to contribute to the solution of a particular kind of practical problem" [p. 80].
>
> 2. Autonomy of the inquiry. ". . . evaluation is undertaken at the behest of a client, but the researcher sets his own problems" [p. 83].

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[1] "Unless inclusion of hybrid inquiry activities becomes essential to the point under consideration, the terms 'research' and 'evaluation' will be used . . . to refer to the 'purest' form of each, basic research and outcome evaluation" [p. 77].

> 7. "Universality" of the phenomena studied. "Program evaluation is depicted as concerned with a phenomenon (an 'educational program') which has limited generalizability across time and geography . . . the concepts upon which educational research is carried out are supposed to be relatively permanent, applicable to schooling nearly everywhere, and they should subsume a large number of instances of teaching and learning" [p. 86].

With respect to these characteristics it seems that applied research is more like evaluation than basic research.

Decision-oriented or Value-oriented Inquiry

Despite these possible flaws, the first essay is quite useful. Their definitions of research, evaluation, development, and diffusion (pp. 69-70) do provide a useful point of departure, and viewing these activities from the perspective of disciplined inquiry may be enlightening. Personally, I have found Cronbach and Suppes' treatment of disciplined inquiry in education to be quite helpful, especially in its distinction of "conclusion-oriented" and "decision-oriented" inquiry. Glass and Worthen apparently relate these two concepts respectively to research and evaluation, viz.,

> "Conclusion-oriented inquiry is much like what is here referred to as research; decision-oriented inquiry typifies evaluation as well as any three words can" [p. 82].

My reading of Cronbach and Suppes leads to the impression that decision-oriented inquiry is a broader concept which certainly includes parts of applied research (as well as operations analysis and operations research) in addition to evaluation.[2]

Although this equation of decision-oriented inquiry with evaluation suggests a very broad interpretation of evaluation, Glass and Worthen are, in fact, much more restrictive. They would explicitly exclude "program monitoring" or "process evaluation" as well as "context evaluation," and they also reject "decision-centered" evaluation models;

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[2] Glass and Worthen note: "Two activities that might be considered variants of applied research are 'institutional research' and 'operations research,' activities directed toward supplying institutions or social systems with data relevant to their operations. To the extent that the conclusions of inquiries of this type are generalizable, at least across time, these activities may appropriately be subsumed under the research rubric. However, where the object of the search becomes nongeneralizable information on performance characteristics of a specific program or process, the label "evaluation" is more appropriate [p. 75].

arguing that these models "neglect two fundamental points of Scriven's definition of evaluation, viz., that the 'activity consists in the . . . combining of performance data with a weighted set of goal scales to yield either comparative or numerical ratings, and in the justification of (a) the data-gathering instruments, (b) the weightings, and (c) the selection of the goals'" (Scriven, 1969, p. 40)[p.76].

Their arguments against a decision-oriented approach seem labored, for on the one hand they assert:

> "Decision-centered evaluation methodologists argue that values are included in their . . . models because a decision is always the revelation of a value" [p. 76], but they also assert "For a values-centered evaluator, however, decisions are implicit in evaluation, i.e., in the process of measurement against value scales, integration of measures into value-statements, and the justification of the measurement and the means of integrating the measurements . . . However, a decision centered evaluation model can be applied without concentrating attention on the process by which a decision-maker integrates information into an overall judgment [pp. 76-77].

In further rebuttal, they note:

> "It would be satisfactory to disregard the direct assessment of value and merely provide data to decision-makers if decision-makers' preferences were always logical, rational, intelligent revelations of value" [p. 77].

Apparently, it is their distrust of the decision-makers' logic, and their trust of the value judgment of the professional evaluator which partly explains their preference for the value-centered rather than decision-centered approach. The practitioner, on the other hand, may distrust the value judgments of the professional and will usually depend on his own judgment to integrate information in any truly crucial decision.[3]

Glass and Worthen note that: "Evaluation can play many roles . . . However, the goal of evaluation must always be to provide an answer to an all-important question: Does the program under observation have greater value than its competitors or sufficient value of itself that it should be maintained?" [p. 77]. But whose value judgments are really brought to bear on this all-important question? Decision-oriented models, at their best, do grapple with what kinds of information are needed by and can be used by the decision-maker(s).[4] The risk of value-oriented models is that they may reflect too greatly the biases of the professional evaluator and cope only with technically tractable value scales and measures, sometimes ignoring information and values of substantial relevance but beyond the practitioner's capacity to analyze or communicate.

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[3] See Howard Raiffa (Decision Analysis, 1968) for a discussion when business executives will rely on technical evaluations of investment alternatives.

Given that one fully realizes that Glass and Worthen are concerned primarily with basic research and value-oriented outcome evaluation, then their extensive treatment of the characteristics that distinguish these two activities is an important contribution. I found the sections on properties of the phenomena which are assessed (pp. 83-84), the "universality" of the phenomena studied (pp. 84,86), and investigative techniques (pp. 86-89) to be of particular interest. And I noted with approbation their statement: "While there may be legitimate differences between research and evaluation methods, we see far more similarities than differences between research and evaluation with regard to the techniques by which empirical evidence is collected and judged to be sound" [pp. 89-90].

Implementation of Research and Evaluation

The same problem with "pure" definitions of research and evaluation, ignoring applied research, carries over into their discussion of the implementation of research and evaluation; for as they note: "The meanings which 'research,' 'evaluation,' 'development' and 'diffusion' hold for a person make practical differences in how he will pursue inquiry" [p. 91]. With respect to disciplinary base, they observe that the educational researcher can afford to pursue inquiry within one paradigm and the evaluation team cannot. I would observe that in practice most applied research, like evaluation, profits from a multidisciplinary base. Similar comments can be made with regard their contrasts of five elements of graduate level training programs for researchers and evaluators. The applied researcher, unlike the basic researcher, does profit from exposure to more than one discipline, from acquaintance with a breadth of techniques, from more organizational and management training, and from exposure to the field during internship training.

This narrow view of research and evaluation must also be considered when one encounters the beginning of their summary of the relationship between educational research and evaluation: "Evaluation borrows inquiry techniques and a knowledge base for recognizing value from research and contributes little in return" [p. 95]. Evaluation in practice (as opposed to an academic position as to what it should be) actually borrows most of its techniques from applied research and development, and it derives its value systems directly from practice rather than basic research. Educational research has all too often succeeded in little more than confirming, albeit in greatly clarifying and refining, what educational practice has already known and applied in a less disciplined way. Applied research, knowledge-based development, and evaluation are richly interdependent and do contribute to each other. The problem for basic educational research may as well be that it contributes little and receives little in return from these other connected, practice-oriented activities.

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[4] Coping with the integration of multidimensional value systems and making choices among them is a major challenge that has been dealt with explicitly by systems and operations analysis. (e.g., Hanssman, 1968; Muller and Starr, 1960; Churchman, 1961; English, 1968).

Development in Relation to Research and Evaluation

Turning to Glass and Worthen's treatment of the relationship of development to educational research and evaluation, I find full agreement with their view of the dependence of development upon sophisticated evaluation. Traditionally, the largest effort at educational development has been by commercial publishers and by schools themselves. Havelock (1969, pp. 3-25) has noted that these organizations both historically and structurally are isolated from the mainstream of scientific knowledge and they rarely attain the internal competence to seek out and effectively use scientific sources of information. Development that is knowledge-based as well as systematic, rigorous, and empirical is a much more recent activity in public education.[5]

I find complete agreement with the authors' point that the laws of the social and behavioral sciences are of extremely limited generality (p. 93), but I wonder why they fail to conclude, based on their own discussion of "universality" (pp. 84,86), that there is relatively little in educational research that can approach the pure type they have characterized, i.e., "relatively permanent, applicable to schooling nearly everywhere, . . . should subsume a large number of instances of teaching and learning" [p. 86].

Their discussion of how basic and practical knowledge can be related is provocative but may in part miss the point by underemphasizing the role played by applied research and technology. Undoubtedly basic knowledge does have a heuristic relationship to educational development. They have emphasized that:

> "Basic knowledge will never prescribe a particular development, but it will stimulate creative minds who understand the basic knowledge to develop materials and practices based loosely on it. If the innovation is developed and evaluated with the best empirical methods of evaluation and applied research, the payoff from basic research can be realized more quickly at a fuller value" [p. 99].

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[5] Rigorous development in military and industrial training programs is at least 30 years old. Glass and Worthen, like so many other writers, seem unaware of the extent to this effort. If educational development is at present in a state of conceptual deprivation (Schutz, 1968, p. 3), then it may as well be due to the parochialism of educational researchers and administrators who have recently become educational developers and managers of development (Gagne, 1962; Glaser, 1962; Stolurow, 1964; Eckstrand, 1967; Uhlaner, 1967; Smith, 1968.).

But I should have liked to see them also underline the statement: "It seems vain to hope that basic knowledge will be implemented without applied research and evaluation to test under special circumstances that which basic research only suggests may be true" [p. 100]. Despite this cavil about emphasis, the entire section discussing the relationship of development to educational research and evaluation [pp. 96-101] is, in my opinion, a distinct contribution to the literature.

Diffusion and Inquiry

Possibly the least satisfying part of the entire paper is the discussion of diffusion and its relation to other inquiry related activities. The treatment is both brief (four pages) and superficial.

In this critiquer's view, educational diffusion may become the Achilles' heel of the entire research, development, and evaluation enterprise. I agree with the authors' view that despite the impressive body of literature accumulating with regard to diffusion, there are relatively few studies that tell us how diffusion actually occurs or what specific skills or knowledges are essential for adequate performance of diffusion roles. But this is troubling for more reasons than the possible misallocation of funds to train diffusion personnel. If the reason for investment in DD&E is practice improvement, then we must make a major effort to study, understand, train, and develop a diffusion capability. Educational diffusion may not be a disciplined inquiry per se, but it sorely needs to be the subject of considerable disciplined inquiry. Conversely, disciplined inquiry critically needs improved diffusion to strengthen its own operations and to provide practical justification for the investments in research, development, and evaluation.[6]

Federal Policy

We have noted that there are in fact two essays within this one paper. The second, titled "Toward More Useful Implementation of Educational Research, Evaluation, Development, and Diffusion" first discusses federal policy and then makes some proposals for organizing RDD&E so that they might be more potent in shaping schooling. Regarding federal policy, they express concerns that disbursement of federal funds to universities for R&D runs counter to the organization of applied R&D in the country and that it threatens to subvert the unique contributions which the universities can make through basic research. Citing National Science Foundation data, they ask, "If applied research and development in other fields are conducted largely within private industry why should applied research and development in education be conducted in universities?" [p. 104].

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[6] Simon Rottenberg (1968), in his article "The Warrants for Basic Research", notes that to know whether basic research should be undertaken or supported as a productive investment, one can only examine past experience and extrapolate to future success. He further observes that calculations of net success and failure values done for basic research in different disciplines and subdisciplines would undoubtedly give different distributions. Given Glass and Worthen's italicized comments on payoff on basic research, and their view of the lack of an adequate knowledge base in diffusion, one wonders how past experience, extrapolated to the future, could lead to other than rather dismal estimates of the value of educational research unless it is "bridged" by much more effective applied research, development, diffusion, and evaluation.

Well, first of all, applied educational R&D is not entirely conducted by universities. Possibly much more than one-third of the rigorous work on educational (and related training) R&D is performed by educational laboratories, other nonprofit agencies (such as EDC, AIR, SRI, or HumRRO), and industry. Second, close examination of their Table 1 reveals, that in 1953-54, 44% of the sources of funds for all applied R&D came from industry. In 1957-58 the figure is 34%. The point is that private industry makes very substantial investments in supporting applied R&D (primarily in the physical sciences) and has thus developed a significant capability that can be exploited by federal funding. Would the reader hazard a guess as to how much industry has invested of its own money in educational R&D? Third, note that the total investment for 1968-69 is $13,701 millions for applied R&D and another $2,146 millions for basic research for a grand total of $15,847 millions. One estimate by the U. S. Office of Education (Gideonse, 1969) would place all educational R&D for the same period at approximately $250 millions or less than 1/63d of the grand total for all R&D.

The point is that applied educational R&D is a very small part of the total R&D enterprise. If one examines the other small fractions of this total that are associated with the behavioral sciences, e.g., psychology, sociology, anthropology, he will again find that, as for education, most all of the funding is federal, and that universities and nonprofit agencies are the primary recipients. Finally, as Glass and Worthen have noted, there are marked differences between scientific knowledge in physics and the social and behavioral sciences. "Social scientific laws are little more than probability statements about the tendency of one variable to be related to another. These laws are highly interactive with factors such as geography, time, cultures, and individual characteristics" [p. 97]. These differences may explain why not only the Office of Education, but also the Department of Defense, and most other government agencies have not turned to industry in funding applied R&D efforts directed toward educational, training, or other social problems.

Organizing RDD&E

Regarding the authors' views that greater payoff can be realized from educational research if (a) it adopts a more interdisciplinary perspective, (b) its relationships to practical problems of development is examined critically, and (c) it is given financial support, I cannot argue with point (a); but, I have reservations about both points (b) and (c). The problem with respect to these last two points is that the view taken ignores serious allocation and organizational problems. Clearly, over the past decade there has been a marked shift in funding from research to development. In the coming decade this trend will undoubtedly continue, along with a substantial (relative) increase in allocations for diffusion (Clark and Hopkins, 1969). Moreover, there is little doubt that educational R&D has not recently enjoyed much support for increased funding from either the Congress or the Administration. Financial support may only be forthcoming when educational RDD&E becomes articulated, organized, and achieves an allocation of funding among its activities that leads to a demonstrable, significant increase in the improvement of educational practice.

I heartily agree with the authors' observation that the reward structure within universities is a major impediment to the effective utilization of educational evaluation talent, and with their observation that there is probably a greater chance of creating new institutions as alternatives to the universities than of altering the reward structures of universities. The educational laboratories are examples in the development area, and the "evaluation teams" of local educational agencies are examples in the evaluation area.

Accountability and/or the Market Mechanism

Glass and Worthen propose a patently simple and "utopian" solution for the problems of development and diffusion, i.e., to move schooling and most of development and diffusion out of the grants economy into the private sector of the economy and under the influence of the market mechanism. They argue that the motivation for developing and disseminating educational products must originate with schoolmen and that this motivation is lacking as long as schoolmen are spared the obligation to maintain a market relation with the public. They note that funds are granted to the educator (grants economy) and he is not required to present feedback to the grantor on how well the funds are being spent. Therefore, the first step in instituting a market mechanism is to make the schoolman accountable for his successes and failures. (This critiquer notes this should also generate a strong demand for evaluators.) The next step would be to create competition, real options for parents and children. They note that it would be foolhardy to underestimate the practical problems of shifting schooling even a small distance on the grants--exchange continuum, but advance the notion in principle that development and dissemination would proceed more rapidly and to greater effect if carried out in the private sector.

It might. It seems more realistic, however, to anticipate movement toward increased accountability for educational practice, as well as for educational research, development, diffusion, and evaluation, all primarily within the grants end of the economy. Solutions as to allocations and relationships among education RDD&E and practice will be dictated by pluralistic political and social pressures and influences far more complex than even those of an open market.

Educational practice and the research, development, evaluation, and diffusion that would seek to improve it are "social goods," rather than "private goods" in the economic sense. Glass and Worthen are right in their concern for "accountability." But all of these activities need to be accountable to something more than a market generated simply by the demands of parents or their children.

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RESPONSE TO THE CRITIQUE

Gene V Glass and Blaine R. Worthen

Hood has written a most comprehensive and analytic critique of our essay on educational inquiry. His critique exhibits good understanding of the major points of the paper and of the more subtle points we attempted to make; such a critique needs little rejoinder and we will restrict our comments to attempt to clarify points which Hood's critique has shown were not clearly communicated in the original paper. The reader is correct who assumes that we are in agreement with any of Hood's criticisms we do not address below.

Hood is disconcerted by the fact that development and diffusion receive relatively less attention in our essay than do research and evaluation. He is especially concerned that diffusion is viewed as lying ". . . totally outside the area of disciplined inquiry. . ." (p.124) and notes that it is unfortunate that our ". . .diagrams regarding disciplined inquiry were not extended to include explicitly the domain of educational practice" (p.124). Hood has proposed a revised diagram (Figure 1, p.125) in which he has juxtaposed spheres of concern for educational practice and disciplined inquiry, resulting in a portrayal of diffusion as directly relevant to educational practice. We have no argument with Hood's diagram or his stress on educational diffusion as an important activity. However, our treatment of diffusion is "brief and superficial" because discussing inquiry-related activities was not one of our purposes in writing the paper. The charge to us was to conceptualize the domain of educational _inquiry_ and discuss interrelationships among components of the inquiry process. As a result, diffusion--a noninquiry function--appropriately received little direct attention. Hood seems to conclude from our statement that diffusion is not inquiry _per se_, that we feel it is unimportant or of less worth than research and evaluation. Such was never our intent. Diffusion is clearly critical if the results of inquiry are to have any impact on practice. However, diffusion is not thereby an inquiry activity any more than reading is an inquiry activity because research reports must be read to be used. Hood stated that "Educational diffusion may not be disciplined inquiry _per se_, but it sorely needs to be the subject of considerable disciplined inquiry" (p.130). We agree, but to claim that diffusion must be the object of inquiry is not to say that it is inquiry itself.

Hood has expressed concern with our unwillingness to extend the term "evaluation" to include "decision-centered" evaluation activities. Our concern is not whether evaluation is decision-centered (hopefully all evaluations will lead to sound decisions) but whether various "decision-centered" activities are genuinely evaluative. Context description and process monitoring are often essential to an evaluation, but in and of themselves they fall short of being evaluations. To reserve the term "evaluation" for activities where explicit valuation occurs does not negate the importance of evaluation-attendant activities which are not directly evaluative.

Hood states that we ". . .propose a patently simple and 'utopian' solution for the problems of development and diffusion, i.e., to move schooling and most of development and diffusion out of the grants economy into the private sector of the economy and under the influence of the market mechanism" (p.132). We did not intend to propose a solution for actual implementation at all. We meant only to propose an "explanation" of the tortoise-like improvement of the schooling system. We are not optimistic that "free-market" schooling ever could be instituted in this country, but we feel that the absence of any of its features may partly explain the lack of attention to development and evaluation in our schools. We expect many more years of the present economic structure of schooling and have no practical alternative to propose; we merely intended our analysis of an alternative economic structure to serve to illuminate problems that exist in the present structure. If we were to write the section again, we would be tempted to sprinkle the term "utopian" liberally throughout our treatise, as Hood would have it.

We applaud Hood's thoughtful critique.

CHAPTER 3

DEVELOPMENT AND DIFFUSION AS MECHANISMS FOR EDUCATIONAL IMPROVEMENT

AUTHOR: Leslie J. Briggs
Professor of Education
Florida State University

CRITIQUER: Norman J. Boyan
Dean, Graduate School of Education
University of California, Santa Barbara

SYNOPSIS

The paper by Briggs essentially picks up where the Glass-Worthen paper leaves off. Its central focus is educational development and diffusion, and in it Briggs describes a consortium based model of educational development that is designed to assure not only the production of good educational products, but their diffusion as well. In addition to substantive focus, the paper also differs from the Glass-Worthen paper in style and point of view. In contrast to the rather formal style of exposition adopted by Glass and Worthen, Briggs uses a more personal, informal, experiential style. Briggs also conceives of his model of development as "research based"--a conception that directly challenges the Glass-Worthen position of development as being essentially an extension beyond the domain of disciplined inquiry.

Briggs identifies 17 steps in the model that he describes. These range from the setting of educational goals and objectives to the preparation of pre- and posttest measures, the development of instructional materials, and the preparation of teachers to use the assessment and instructional materials. The notion of cooperative decision making in the operation of the model is consistent with Gideonse's notion of participatory decision making in the operation of a market model (see Chapter 1).

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DEVELOPMENT AND DIFFUSION AS MECHANISMS FOR EDUCATIONAL IMPROVEMENT[1]

Leslie J. Briggs

Florida State University

Introduction and Overview

In the examination of various means by which educational changes and improvements have been or in the future may be brought about, the author concurs with Schutz (1970) that:

> "While there is a vague realization that it should be possible to translate available relevant knowledge into a form that permits improved educational practice, it is erroneous to assume that the means for doing this are presently clear" [p.39].

The place of development and diffusion as systematic activities for bringing about educational improvements is in a youthful stage, experiencing rapid growth, but not yet being fully realized. An underlying rationale for this paper is the author's belief that the nature and scope of educational development, as a set of science-based activities, is still to be defined; and, the concept of educational diffusion is still searching for meaning and application.

For purposes of entry into the topic of this paper, the definitions of development and diffusion offered by the National Center for Educational Research and Development (Gideonse, 1969) are recognized.

Educational development is defined as:

> ". . . (the production of) materials, techniques, processes, hardware, and organizational formats for instruction. The basis of such development is our knowledge about learning, motivation, instruction, and education. The materials and

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[1] The absence of the words "research" and "evaluation" in the title of this paper is intentional. Since other papers in this series heavily emphasize the functions of research and evaluation in bringing about educational improvements, it was intended that this paper focus more directly upon the contributions of development and diffusion. Therefore, other papers in this series will be relied upon to present many "ground-clearing" definitions and theoretical positions of research and evaluation to development and diffusion. Formal definitions will be minimized in favor of descriptions of what has been done and what might be done in the future.

> techniques developed are designed to accomplish certain objectives, specified in advance, which are construed to be part of the broader goals of instruction or education. . . Examples of development in education include the construction of programmed instructional materials, the building of curriculum units, the designing of computer-assisted and computer-managed instruction, and the validation of teacher centered instructional techniques based on our knowledge of teacher-pupil interactions. Careful development of television programming, the construction and validation (as to learning effect) of single concept films, and the development of new organizational forms for schools and universities are further examples" [pp. 3-4].

Similarly, Borg (1970) has pointed out that the two goals of development are: (*a*) to produce products whose effectiveness has been sufficiently established, and (*b*) products in a form which are ready for operational installation in the classroom. Comparable definitions of development have been proposed by Hemphill (1969) and Schutz (1970).

Diffusion has been defined by Gideonse (1969) as:

> ". . .the entire process by which innovations are spread throughout a culture, a profession, or some other expanded social system. Dissemination mechanisms may be a key factor in the diffusion process, but so might the active support of rigorous development or the provision of adequate support for research" [p. 4].

Following the pattern set by this definition, *educational diffusion* in this paper will refer to all means of bringing educational developments into effective classroom use on a widespread scale. Thus, dissemination becomes one means of diffusion. Other means are formal and inservice teacher training, demonstration, installation, utilization of consultants, workshops, seminars, and all messages conveyed by any media designed to promote the adoption or utilization of educational information or products. Definitions proposed by Jung and Lippett (1966), Havelock and Benne (1967), Farr (1969), and McClelland (1969) offer support to these dimensions of diffusion activities in education.

Two general questions are considered within this paper: (*a*) how do development and diffusion activities typically take place in education, and (*b*) how might their purposes be better achieved?

The primary aim of the paper is to present a view of development and diffusion activities that will assist in making them more effective for the improvement of education. A supporting aim of the paper is to describe selected considerations that have contributed toward this proposed view of educational development and diffusion.

This paper is not intended as a definitional or theory-generating treatise, or as a comprehensive or exhaustive review of the "state-of-the-art" in educational development and diffusion. Rather, the paper is intended as a selective and illustrative view of the purposes and means of educational development and diffusion as they have taken place in the past, as they are currently practiced, and as they might occur in the future. This view is based primarily upon the author's experience with development and diffusion efforts over the years in many contexts.

The remainder of this paper is organized in five sections. The first section is a summary discussion of several alternative means or "mechanisms" which the author sees as available for bringing about educational change, methods which they may employ to bring about change, and resources which they may use to support change. The author's preferred mechanism for educational change is highlighted and discussed in terms of the process of change.

Following this is a summary and analysis of various ways in which educational change and innovation have been looked at in the past. The literature review of Havelock, Guskin, et al., (1969) is summarized around "models" of diffusion (dissemination and utilization) which Havelock, et al. identified during their survey. These "models" of diffusion include the research-development-diffusion model, the social interaction model, the problem-solver model, and the linkage model. A critical reaction to these models is presented, focusing on their deficiencies for describing educational change and innovation.

Section three in the paper attempts to identify guidelines emerging from successful development and implementation efforts of the past. Prototypes of past successful development programs are discussed, including examples from the military, industrial, and educational settings.

The fourth section is an examination of educational development as it is currently practiced, including those who are involved with educational development, the kinds of developmental activities which are performed, and techniques which are employed. Three major areas of educational development are examined: commercial publishers, curriculum development projects, and professional researchers-developers.

The final section of this paper, to which each of the four preceding sections contribute and support, is the proposed model for development and diffusion in education. Section five includes an identification of the basic assumptions underlying the proposed model, a description of the general components which comprise the model, a discussion of factors to consider in applying the model, an analysis of elements which will effect the success of the model, and some notes on organizational change advocated by the model.

The paper begins with the author's view of educational change and innovation, including mechanisms for and the process of it.

Educational Change and Innovation

There is a rapidly growing literature which deals with major educational improvements that have been brought about by the dissemination and utilization of knowledge and products. Havelock, et al. (1969) have indicated that this literature on educational innovations, consisting of about 100 studies in 1955, grew to over 4,000 studies in 1960. Undoubtedly, it is much larger now. Havelock estimates 10,000 references at the start of 1969.

After a thoughtful review of dozens of reports in this literature, this writer has concluded that there is no singular means by which changes have been produced in the past and are being produced at the present time. Therefore, the writer advocates a different view of educational change and innovation from that appearing in the literature. Seen in a broad perspective, and underlying this view, is the hypothesis that specific changes in education depend largely upon three factors: (*a*) who wants the change, (*b*) what general method is used for producing the change, and (*c*) what resources for change are employed. To show how these change-related factors may interact, a few examples are considered in terms of how not one but several mechanisms may be used for bringing about educational change.

Mechanisms for Change

Mechanism, as used in this paper, is defined as any means for combining activities and resources to accomplish a definable goal or objective. Alternative mechanisms for educational change are described in the following paragraphs, starting with the consideration of *who wants change*.

1. When an *aroused society* wants change in education, it seeks a shift in the finances which support federal programs, a reform in the management of federal or state educational agencies, or the initiation of new policies through recall, referendum, and legislation. Some methods may be quicker than others, but the principal result is the same: new persons assume power and responsibility. These new power figures then know that their retention of authority rests upon making the kind of changes promised or desired.

2. When a *concerned community* desires educational change, it modifies either the personnel or behavior of the school board and the school administration. When the desires of community are the same as those of the local educational leadership, rather radical changes have taken place peacefully in a relatively short time, as described by Esbensen (1968).

3. When a *local teacher* desires change, he confers with other teachers and local sources (knowledge "linkers") who keep abreast with changes in outside institutions, such as universities or research centers. He also seeks information from professors, researchers, industry,

or other sources, looking to find the technique or product that appears to suit the desired change. In some instances the teacher may develop his own innovation, but the innovation is not likely to come into widespread use because of lack of an organization to diffuse the innovation.

4. When a researcher wishes to institute change, he has typically attempted to bring it about by dissemination of information, by persuasion, and by personal contact with teachers and schools. As Borg (1970) has indicated, neither the local teacher-made innovation nor the dissemination attempts of the individual researcher have been spectacularly successful.

5. When an industry wants to bring about change in education, it most commonly takes a marketing approach to use a product as the actual change agent. Since products are easier to diffuse than are ideas or research findings, the marketing approach has been more successful than some of the others just mentioned, but it involves the risk of self-serving rather than public-serving. It also finds its appeal more directly to the judgment of the teacher-customer than to the public the teacher is supposed to be serving. For this reason, in the future a new mechanism may be created by which the public sets the general goals of education, the educationists (including the researcher) translate these to needed product specifications, and industry produces the desired products (Briggs, 1970b). Variations of this aspect of marketing can serve the needs of the public and of industry.

6. When a combination of educational and research institutions want to bring about change, the consortium approach appears to be a most promising and satisfactory mode of change. Such consortia can include schools, universities, policy research centers, educational laboratories and research centers, and/or industry. A consortium can be sensitive to the wishes of the public as to its desired goals of education; it can utilize the expertise of researchers in deciding upon the kinds of products and processes needed to reach the goals; and, it can utilize the resources of industry to produce and install the desired products. It also has the potential for coordinating the new processes and products with both the preservice and the inservice training of teachers. Furthermore, it has the multiorganizational resources which make possible a comprehensive orientation of evaluation, field testing, and product improvement through formative development. Such efforts can involve federal agencies, such as the U.S. Office of Education, or the proposed National Institute for Education (NIE), and can become the means for increasing the effectiveness of State departments of education. The consortium approach to educational change can bring about organizational self-renewal to operating agencies; better goal direction to research agencies; more effective use of industrial potential; and most important, educational accountability to the public served.

The foregoing discussion of various mechanisms which may be used for bringing about educational change are summarized in Table 1.

TABLE 1

A Summary of Some Mechanisms and Related Factors for Bringing About Educational Change

Who Initiates	Method(s)	Resources	Mechanisms
1. Aroused society	Revision of federal programs, Reformation of edcation agencies, Initiation of new policies	Accountability, Stimulus for self-renewal	New Personnel, Fiat
2. Concerned community	Personnel changes or revitalization	Redefinition of priorities, New Methods	Improved school-community communication
3. Local Teacher	Seek out knowledge	Local knowledge "linkers", Professional societies, Universities, Information centers	Invention, Adoption, Application
4. Researchers	Persuasion, Publishing, Teaching, Consulting	Research information, Publications, ERIC system	Dissemination of information, Translation of research findings
5. Industry or Curriculum development teams	Production, Marketing, Development	Capital, Organization, Equipment, Personnel, Writers	Salesmen, Advertising, Promotion, Teacher training
6. Combination of Education, Industry, R&D agencies	Consortia for: Research, Development, Diffusion, Installation, Testing	Public contact, Expertise, Models, Knowledge, Experience, Multiple funding	Systems analysis, Development models, Teacher training, Research information, Team development, Cooperation of school and industry

Process of Change

Within the body of literature on educational change and innovation, one finds the recurring assumption that educational change is essentially a persuasive process by which research knowledge gets disseminated to the teacher, who first is aware, then interested, and then persuaded to try and then adopt a classroom procedure which is an application of a research finding. But in the opinion of this writer, precious few improvements are made by this process, and the effort devoted to cajoling, pleading, coaxing, and explaining is too out of context for most teachers to make the application.

Therefore, some insist that what is needed is translation of the research finding into language which the teacher can understand. But the viewpoint taken here is that we do not so much need translators as we do educational engineers who can apply research findings in the design of workable (and testable) products, techniques, tools, or instructional packages.

Just as this writer sees little to be accomplished by translation, in and of itself, he also sees little need for an isolated practitioner of diffusion. The process of creating widespread and significant change is seen as more nearly requiring an approach similar to the consortium method. Through consortia, plans for installing, testing, and institutionalizing change are built into the development-utilization plan by prior arrangements of member organizations of the consortium.

The writer does not wish to be thought of as having summarily dismissed the bulk of literature in disseminating, diffusing, installing, testing, and institutionalizing educational change. However, he has seriously and thoughtfully concluded that the best context within which to refer to these functions is in a consortium-based model, such as the one presented later in this paper.

Within such a model, the researcher's role is not restricted to doing research. He designs, consults, interacts, and assists in many aspects of the development-utilization continuum. Many researchers, so trained, are now excellent developers. In fact, the most skilled developers may be reseachers who are also able to manage a complete research to installation/utilization effort for an entire consortium.

Another reason the consortium arrangement for educational change is highlighted in connection with development and diffusion in this paper is that many alternate versions of how research aids development and diffusion are self-defeating. That is, sometimes researchers, developers, and other team members of a curriculum development effort set out to design a set of materials that will have the widest possible acceptance by teachers who are uninfluenced by an aroused society, a concerned locality, or a dynamic school administration. Under those arrangements, only gradual, step-at-a-time changes can be sold to the teachers. Such projects may cost as much for a small, widely-accepted change as a project bringing great change would cost under a prior-agreement, consortium-based arrangement. This is not greatly different from approaches used by industry, whereby only such changes are introduced as can be sold to a wide range of unorganized, separate school systems.

While a product is easier to sell than an idea, a product so sold to unorganized masses of teachers must not be greatly different from products they are now using.

This is not to say that it is unworthy to introduce small changes to groups of teachers by a curriculum development team or by an industrial approach. It is to say that it is precisely when there is not an aroused public, and not a concerned community, that the industrial approach may be most appropriate for small change.

Since minor changes made acceptable to unorganized masses of teachers is so similar a process, whether done by a curriculum development team or by industry, the industrial marketing method will not be further discussed here, nor differentiated from the curriculum/development team method. The persuasive or marketing aspects are similar, though the curriculum/development team may carry more prestige and get better cooperation in training teachers to use the product.

It is to be hoped that this discussion of the curriculum/development team approach is not construed as an indication that such teams of professional people cannot produce products superior to those produced by industry when operating in its conventional, solitary role. It is, therefore, necessary to distinguish between the intent of the ground rules.

If a professional development team sets out to produce the best product it can and to influence (and train) as many teachers as possible to use the product, but in no case to compromise the product based on estimates of large scale acceptability, then quality and amount of improvement have priority over sales. If sales are placed first, then quality or change may be in danger of being compromised, with little difference in the product whether developed by industry or by a professional team. However, to develop an optimum product, which will be adopted, advance support is a most important ingredient. Again, the consortium-based approach is seen as one effective way to get this advance support.

Planning for Educational Change and Innovation[2]

Havelock and others (1969) have achieved a most recent and comprehensive review of the diffusion literature in their report entitled Planning for Innovation: A Comparative Study of the Literature on the Dissemination and Utilization of Scientific Knowledge.

The very title of the report by Havelock and his co-workers, as compared to the title of this paper, reflects the two different stances taken in the two documents. Havelock was reviewing at an earlier date and he was intentionally writing a review, not a "position paper." He was thus reacting to existing models of change, not presenting a model of his own. With these considerations in mind, the fact remains that his view of the research-development-diffusion model for change seems to differ markedly from the stance taken by the present writer. His evaluations were probably a reflection of the amount of empirical data available in the literature he reviewed for the models he was comparing and contrasting. However, his reviews of change as a function of dissemination and utilization of knowledge differ from the present writer's view of the development and diffusion of products (placed in the context of accountability and organized effort) as the most powerful view for creating change and innovation in education. Furthermore, the present writer feels that Havelock's report neglects some of the important features of the research and development process and how they support the diffusion enterprise. Perhaps these features do not appear as clearly in the literature as they loom prominent in the thinking of a practitioner of research and development.

Nonetheless, Havelock's review has performed a great service in providing in a single volume the substance of a literature which is so widely scattered in a large number of sources. The present writer responds to that report in two ways here. First, a very brief noncritical summary of Havelock's findings is presented as he has organized and evaluated them. Second, the writer offers comments on Havelock's findings from the standpoint of a supporter of research and development in education.

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[2] The list of References reproduced in this paper does not indicate the extent of the sources consulted. Essentially, three independent samples of the literature were used. Havelock's review is, of course, the most comprehensive source that was read. Second, a large collection of papers, assembled by the project staff at Teaching Research in Oregon, was made available. Third, a locally-initiated ERIC search was made. The writer felt that these three ways of viewing the literature all gave about the same overall account of approaches to educational diffusion. Little new was encountered during the later phase of the reading done by the writer. Since the writer has taken this particular stance in relation to the literature, he saw less need for more detailed citations. The purpose of this section of the paper is to react to the literature rather than to document it in detail, so the references do not at all constitute a history of research on diffusion. Havelock's review is closer to that function, and so is his reference list a much better acknowledgment of the work of the people who have labored the most in this area of research. Since his review is available, perhaps no further apology is needed concerning the absence of names of those workers in this paper.

Havelock's Review

The summary, synthesis, conclusions, and implications of the Havelock study are presented in Chapter 11 of the project's final report. He first comments upon the following features of the literature surveyed: large quantity, rapid growth, wide scope, large proportion of empirical studies, and wide dispersion of sources.

In quantity, he found the volume of literature to exceed his initial expectations. The field of education accounted for 17% of the sources: agriculture accounted for 13%, and communication accounted for 13%.

Rate of growth of the literature was viewed as impressive as the quantity.

The scope and variety of the literature led Havelock to conclude that the two words dissemination and utilization "covered a lot of territory" [p. 11-2]. One source of great variation in the dissemination/utilization studies was size of adopting unit; another was wide perspective from macroscopic to microscopic; and, a third was range in type of study--experimental, case study, field research, and theory. The scope of contexts covered curriculum diffusion, administrative arrangements, organizational change, technology diffusion, and new roles and organizations. Variety was also found in studies classified as research, development, and "practical wisdom."

Within this chapter, Havelock also presents an overview and synthesis of four models for the dissemination and utilization (diffusion) of knowledge. In the four subsections to follow, his overview is summarized. Please note in these summaries that the four models reviewed in the literature by Havelock differ greatly in the stress upon *development*. While the view favored by this writer places *development* and *diffusion* on a par level in the research-development-diffusion model, this is not always characteristic of the three other dissemination/utilization (diffusion) models. Also note, as previously discussed, that the three other models view change as taking place by the utilization of *knowledge*, while the research-development-diffusion model views utilization of *developed products* as the principal change-agent. It is obvious that knowledge is utilized in the research-development-diffusion model, but also *products* and *evaluation* loom large in the picture.

The research, development, diffusion (RD&D) model. This model is broken down into different numbers of subcomponents or characteristics by different writers, but Havelock (p.11-5) sees these all reducing to five features:

1. Dissemination and utilization should be a rational process, requiring a *rational sequence* of activities from research to diffusion.

2. Planning in a massive scale must be employed to coordinate the entire process.

3. Division of labor is necessary due to the massiveness of the process, resulting in a necessary separation of roles and function.

4. A passive consumer is assumed to be the target audience; he will accept the innovation if it is delivered skillfully. Scientific evaluation at every stage of research, development, and diffusion is supposed to bring about acceptance.

5. High initial development costs are assumed, and are justified because of the larger long-run gains in terms of efficiency, quality, and massive utilization.

Prototpyes of the RD&D model are seen in industry, defense, space, and agriculture. In education the following proponents were cited: Henry M. Brickell, Egon Guba, and David Clark. This model is cited as useful at the macrosystem level because it provides for multiple organizations and roles, thus linking research, product, practitioners, and consumers. It is also seen as a major basis for policy in the U.S. Office of Education. Acknowledgment is made by Havelock that while flowcharts depicting this model often imply a linear flow of actions and information, feedback and redesign are in fact characteristics of how the model actually works. Yet, the linearity of the process as depicted by Havelock overshadows these potential interdependencies.

Although Havelock notes the RD&D model to be "a very useful and relevant paradigm for technical and social change" [p. 11-5], his basic criticism is that the RD&D model is ". . .over-rational, over-idealized, excessively research oriented, and inadequately user oriented. . ." [p. 11-7]. Havelock cites Frank Chase for suggesting that Guba and his colleagues have spelled out the model so clearly that it gives other educators something to criticize or to avoid by design of alternate conceptualizations.

The social interaction model. This model, growing out of work by Barnett in anthropology, does not deal with research and development, per se, but it assumes them as a precondition for study of the diffusion process. This model has little to say of how science and technology may function to bring about new products. Rather, it deals with products which are in existence. A typical example involves innovations which are in a concrete, diffusable form, such as an audiovisual device. The innovation is hence a stable product whose flow through the social system can be studied. This flow is studied in the form of social structures and relationships of the people involved.

According to Havelock, the theory and research supporting the model stress the following: (a) the importance of the social relations network, (b) the importance of personal relationships, (c) the user's position in the network, (d) the importance of group identifications, (e) the irrelevance of size of adopting unit and (f) different influences' import at different stages in the process.

This model acknowledges the relatively minor role that publications play, as compared to face-to-face contacts among people, in obtaining dissemination to a passive audience. Given the passive audience, the importance of human interactions of a complex nature is emphasized. In this model "opinion leadership" exerted by members of the target audience is a major influence upon adoption. The prestige of such persons, their norm-setting behavior, and their frequent interaction with others inside and outside their own group are important. It is also in this model that appear the "innovator," the "laggard," and the "early majority."

With relatively stable and easy-to-use innovations like audio-visual devices, one can see how the social interaction model can embrace the work of the researcher, the manufacturer, the field representative, the early user, etc. In applying this model, it would appear that many, such as classroom teachers, are more influenced by what their peers are using than by results of research and testing conducted by the "expert." In some instances word-of-mouth communication appears to do better than research reports, for example, in the field of agriculture where the role of the county agent is important in helping obtain the early adoption of developed products.

The work of Theodore Newcomb is cited as significant in revealing how firm roots in a culture in early life can result in persistence of old attitudes in spite of exposure to new attitudes and information. Firm belongingness to reference groups leads members to retain the group's value system. On the other hand, innovators move from group to group, enabling them to see personal value in things not valued in some of the groups. Havelock points out that if large numbers of people maintain diverse contacts with differing groups, a highly innovative society would result. One merit of research relating to this model is that while person-to-person contact is important, results have been studied for all sizes of groups and organizations of diverse kinds.

The stages of adoption on the part of a person or organization, according to this model, are: awareness, interest, evaluation, trial, and adoption. Different influence strategies are effective at the various stages. The effective media studied for the different stages of adoption include mass media, demonstration, contact with experts, and informal contact with peers, respectively.

While, historically, research on this model began in anthropology, later key influences cited by Havelock in social psychology were made by Newcomb on "reference groups," and Lewin on "gatekeepers" and group decisions. Rural sociologists, such as Ryan and Gross, then came into prominence. Among user groups studied within this model have been physicians, scientists, farmers, and teachers.

Shortcomings in research in this model as cited by Havelock include: the failure to relate adoption decisions to internal processes of attitude change or personality or learning variables; the relative lack of study of organizations as such; and, the neglect of information flow within organizations. Still, Havelock ranks this model highest in empirical research support.

The problem-solver model. This model assumes that the user is an active seeker of a solution to a problem: he has a need, so he takes the initiative in filling the need or solving the problem. While dissemination and utilization of knowledge is only a part of the problem-solving (need reduction) process, the entire process is conceived as approximating the following steps:

(a) the need is sensed and articulated;
(b) the need is seen as a problem to be solved;
(c) a search for sources of relevant information;
(d) the identification of potential solutions;
(e) the converting of solutions to prototype actions; and,
(f) the try-out and evaluation of the solution.

If the solution tried does not satisfy the need, the process starts over until the need is fulfilled.

Havelock reports there is less empirical evidence concerning this model, as compared to the social interaction model, but that there has been a recent surge of interest in it as seen in the establishment of organizations and units devoted to helping find solutions, including the work of Benne, Lippitt, Miles, and Watson.

In the problem-solver model, the user is both the sensor of the need-problem as well as the evaluator of the adequacy of the solution. Hence the process does not end with something being "sold," but instead it ends with a satisfactory solution to the problem as seen by the using agency. Also the emphasis upon diagnosis of the need may be a safeguard against trial of inappropriate products that are available as the "solution." An outside agency may serve as a nondirective consultant who helps the user exercise his own problem-solving skill rather than imposing a solution upon him. This model exercises the internal resources of the user in finding his own solutions, perhaps by adapting an available solution to his situation. The user must not only accept the solution, but by regarding it as his own internalizes the solution into his motivational system.

The weak points of this model as seen by Havelock are: (a) it puts the burden on the user, straining his internal resources, (b) it minimizes the role of outside agencies and available packaged solutions, and (c) it does not provide a model for massive utilization.

The linkage model. This is Havelock's attempt to combine the most outstanding features of the other three models summarized above. His synthesis model indicates:

(a) a focus on the user as a problem-solver who uses outside resources skillfully;

(b) the user and the outside source "go through" the problem-solving process of each other by simulation (this establishes a reciprocal relationship, not a one-way relationship); and,

(c) government facilitates this reciprocal relationship by monitoring, providing introductions, seeing that the R&D

function is performed, establishing networks of social influence, and facilitating problem-solving by the user.

Havelock also discusses other models of dissemination and utilization which might be derived, but which do not appear discernible in the current research literature. For example, the historical dialectic of Hegel and Marx may support a model based on conflict between forces fostering change and those opposing it. The present turbulence in society strongly suggests the possible appropriateness of such a model. Havelock also suggests that current efforts to use research for highway safety systems grows out of a confrontation between automakers and congressional committees. This type of event does not seem to fit either of the four models reviewed by Havelock. Such events as efforts to reform universities, to rebuild cities, and to bring racial equality are seen as requiring a more comprehensive model to relate these catalytic events and social forces and conflicts into a broad social, historical, and political context.

Comments on the Review

This writer feels that there are current trends and pressures in society which make the present literature on diffusion a fairly poor predictor of the diffusion techniques and models which will come about in the future. This is a primary reason for describing alternative mechanisms for educational change in the previous section. Beyond this, however, the writer also feels that both the literature of the past, and the review of it by Havelock, implicitly assume the permanence of the status quo by (a) failing to suppose that current institutions and customs will change, (b) failing to relate the research-development-diffusion model to multiorganizational efforts, and by (c) failing to grasp the likelihood of more pressure from sources external to education, requiring it to change.

More specifically, the literature summarized in the diffusion models, Havelock's review of it, and his suggestion of a new linkage model appear to largely overlook the following possibilities:

1. Changes in teacher training. The literature appears to assume the permanency of an outmoded system of teacher training, resulting in a permanent conservative stance of teachers toward new ideas and techniques. Thus teachers, by the "social interaction" model, must be coaxed, cajoled, and persuaded to even consider newer techniques; and, by the "problem-solver" model, a few are expected to realize the need for change, and to seek outside help in devising the solutions. Both these models largely overlook the likelihood that a sizeable development effort may be needed; they assume either that the solution can be reached by applying research knowledge, or that the needed development has already taken place. And of course the research-development-diffusion model is regarded largely as an intrusion of outsiders with products to promote, whether or not these products are ideal solutions for the problems to be faced. Almost none of the diffusion literature acknowledges as possible, to say nothing of predicting, that improvements in teacher training may come about with the result that most teachers are trained to appreciate current and predicted innovations, and to permanently retain

a forward-looking acceptance of and search for realistic opportunities to apply new techniques. This writer is reasonably optimistic that just that kind of teacher training is forthcoming, either through present training institutions or through the creation of new arrangements of teacher training. If this does indeed come about, future teachers would neither have to be influenced, as by the "social interaction" model, nor to be solely responsible for initiating solutions to serious current problems. Rather, an entire stance of seeking constant improvement would be built into their outlook, and they would be aided by multiorganizational agreements to facilitate new teaching approaches.

2. Use of other kinds of schools. The diffusion literature does not reflect the possible use of contractor-conducted education, or the use of voucher systems, currently being considered or tried in isolated instances. It also takes no note of privately operated innovative programs for either early childhood education or for remedial instruction, such as has been conducted by Lloyd Homme at Westinghouse Learning Corporation in Albuquerque. While such special programs are few in number now, it is conceivable that increasing numbers of children might be so educated in the future. And it is not unusual to find that the innovator of such programs is also the manager of the program. If any of the models reviewed by Havelock would be descriptive of these programs, it would be the research-development-diffusion model. When children go to such schools by arrangement among organizations (schools and R&D agencies), rather than by private arrangements with parents, clearly neither the "social interaction" nor "problem-solver" model would be more relevant.

3. Public pressures. The diffusion literature reads as though the public will take no hand in forcing educational change, by one means or another. Nothing is said of community impact upon plans for educational change, nor of peaceful or violent protest or rebellion. But the current upheavals will surely bring forces for change not noted in current models, thus leading as Havelock suggests to a new means for change and hence new models. As a case in point, the current emphasis of "accountability" suggests new methods, new materials, and especially new measures of educational outcomes. Surely, various forms of "conflict" models can be expected to appear in the relatively near future.

4. More emphasis upon multiorganizations. Much of the diffusion literature deals with person-to-person relationships rather than with relationships among organizations. The writer would expect to see in the future many more voluntary cooperation instances among organizations, as distinct from between individuals. Of course, the educational R&D laboratories were designed with this in mind, even though they are presently in reduced circumstances. In the long run, it is predicted, important improvements on a massive scale require consortia for development and diffusion. Thus, adoption would be a part of the original agreement among the user and resource organizations.

5. Powerful new discoveries. Almost none of the diffusion literature lists predictions of important and powerful new techniques expected in the future. Therefore, the possibility that new discoveries might be diffused and adopted by new means has also been overlooked. Just as

educational policy research centers are trying to look into the future to suggest needs for new curricula, so we need to be looking into the future when thinking of future diffusion mechanisms.

It appears, in summary, that the nature of the diffusion literature has been to look back and around, but not much forward. If other kinds of planning require looking ahead, so likely does planning for diffusion in education.

In addition to the above features of the diffusion literature, a final criticism is that the research-development-diffusion model has not been looked at and reviewed in as broad a context as is necessary to judge its adequacy. However, rather than detailing criticisms here, the writer will try in a more positive fashion in the next sections to outline a broader view of present research-development-diffusion models.

Successful Development Prototypes

As indicated in an earlier section and in the opinion of this writer, there is a widespread misconception in the literature regarding how educational change can best take place. There are several facets to this misconception.

First, there is the idea that research findings on one hand, and developmental products and techniques on the other hand, can be effectively diffused by the same mechanisms. Second, there is the assumption that educational change is to be brought about by the teacher's utilization of research findings.

Borg (1970) has presented a review of two earlier attempts to change education: (a) by local innovation strategy, and (b) by educational research strategy. He shows that both have failed to bring appreciable or widespread change, and he presents his analysis of the reasons for these two failures to bring about improvement. He therefore recommends "research-based development," which involves repeated evaluation and revision of the product or technique until its design objectives have been proven to be met, and before it is delivered in user-ready form for widespread use.

In agreement with Borg, the present writer believes that research findings are best used by the professional researcher/developer who makes discriminating, expert use of research as a facet of his development, and who, in turn, has the skills in both formative and summative evaluation to guide product refinement and testing before the product is "disseminated" to others. The research-trained developer would appear to be the best user of research information in terms of converting research knowledge into instructional products. This is not to say that other professionals, such as the writer of textbooks, cannot utilize research findings to good effect; but, it is to say that efforts to disseminate research findings in raw form to the average classroom teacher is an exercise in futility. Thus, it is information about products and techniques which should be conveyed to the classroom teacher, and research findings which should be conveyed to the professional researcher or developer.

As part of a search for guidelines for successful developments and implementations, it may be useful to digress momentarily to see whether lessons may be learned from the military and industrial training settings. The following historical review of some prototypes of successful developments should lend support to the viewpoints expressed above.

A Military Prototype

No official history has been written of the mission and operations of the Air Force Personnel and Training Research Center (AFPTRC). Nevertheless, work done there during the period of about 1948-1957 accounted for some of the pioneering work in new instructional development techniques, including the following: task analysis, taxonomy of learning tasks, simulation, programmed instruction, films, job aids, abbreviated reference manuals, and many others (Lumsdaine & Glaser, 1960; Gagne, 1962; Briggs, 1959).

As noted earlier, these developments were based on some key developmental concepts now more widely acknowledged by educational developers, such as: clear definition of training goals or objectives (Mager, 1962); classification of learning tasks into types of learning and their conditions (Gagne, 1970); careful sequencing of instructional units and hierarchies of skills (Gagne, 1970; Briggs, 1968a); use of the new media and media selection (Briggs, Campeau, Gagne, and May, 1966); and, integration of these components into an overall systematic procedure for the design of instruction (Briggs, 1970a; Tosti and Ball, 1969).

It is noteworthy that most of the instructional products of the Maintenance Laboratory of AFPTRC were in the form of booklets, films, simulators, that is, concrete devices and materials whose use required a minimum of training of the instructor. The implementation of the devices in the classrooms of the training center was a matter requiring simply the briefing of the instructors. The products were tested under controlled conditions before being recommended for widespread operational use. The developers of these products were researchers with a "flair" for (and a mission of) development. They were capable of utilizing research knowledge, but they actually profited more from taking what would now be called "a systems approach." And, very interestingly, after the practical classroom effectiveness of some of these devices had been demonstrated, they were later used for basic research studies in the psychology of learning. For example, a device called the "Subject-Matter Trainer" (Briggs, 1959) after experimental proof-testing in a classroom experiment was then used to study prompting/confirmation and self-pacing.

Here, then, is a prototype of how demonstrated improvements in military technical training were brought about. Also illustrated is the fact that development can feed research, just as in other instances research may feed development.

An Industrial Prototype

Several years ago a contract was arranged between the American Institutes for Research (AIR) and the American Telephone and Telegraph Company (AT&T). This contract was in response to the need of AT&T for a more effective and efficient way to teach first aid techniques to employees. The several companies of the Bell System had previously developed their own first aid training program, required of all employees. The average such program required 10 hours of instruction. AIR contracted with AT&T to prepare a multimedia program of 7.5 hours, and to improve it through formative evaluation and revision procedures until it was more effective than the conventional programs. The objectives were based on, and compatible with, the Red Cross First Aid Manual, which was also the basis for the existing training programs.

The procedures employed in this program development have been summarized by Markle (1967). Performance testing of samples of the target population was conducted for more purposes than to revise first-draft materials. Tests were used to determine entry knowledge, to achieve adequate congruence between objectives and materials, to discover where learning time could be saved, to verify instructional sequencing and media effectiveness, to check for omissions in content, as well as to improve the effectiveness of the program.

The entire program was subjected to three empirical tests and revisions, and some parts of the program (film sequences, narration, and text material and practice questions) underwent several additional revisions.

On the final program, employees trained by the new course in 7.5 man-hours scored 270 on a test over the objectives, as compared to a score of 145 by employees having 10 hours of training on conventional courses, and a score of 85 for employees having no formal first aid training. The standard deviation was much smaller for the experimental group; in fact, the lowest-scoring person in the experimental group scored higher than the highest-scoring person in the conventionally trained group--nonoverlapping distributions!

This unusually successful development cost $250,000 for the 7.5 hour training program. But when one considers that the packaged (and, hence, reproducable and exportable) program could be used for many thousands of employees each day, the development costs were amortized to less than one dollar per trainee, and the 2.5 man-hours saved represented an additional savings to the member companies. While future research is needed to translate the superior test scores to lives saved and shorter recovery times of accident victims, the obvious economy of the program is attractive when development costs are considered in light of total savings through widespread utilization.

Even when the solution is not a product, but a process or technique to be implemented by the teacher or administrator, it is important that it can be demonstrated or described in concrete form rather than in theoretical terms; that is, that it be a completed process, ready for implementation, rather than merely the rudimentary components of a process.

An Educational Prototype

Borg (1970) states that whereas local innovation may always be a good source of new ideas, it rarely provides more than the seed for a potentially successful development. While a simple idea, like using colored chalk, may spread from a local usage, something as complex as team teaching, he indicates, in spite of many successful trials, is not in itself a comprehensive program that a principal can visualize and implement from the scant information available to him. Many local efforts are abandoned for lack of sufficient information from the literature, or even from visiting and observing, or attending workshops. So, most local innovative developments, Borg says, are never used successfully by anyone except the originator himself. Poor exportability and lack of rigorous evaluation are cited as two reasons for the failure of this method of diffusion, as well as its inefficiency and expense.

As an example of a successful educational prototype of "research-based development," Borg (1970) cites the minicourses developed by the Far West Laboratory for Educational Research and Development. These are self-contained instructional packages for inservice teacher training. A cycle of evaluations and revisions, averaging 18 months and 7,000 man-hours at a cost of $100,000, results in a program of known effectiveness. But when widely adopted, more than the cost of the programs can ultimately be returned to the treasury. Using this method relieves teachers of the impossible demand to be inventors as well as practitioners. In support, Borg cites the medical model, in which the physician is to diagnose and prescribe, but not necessarily invent and evaluate new medicines. Highly motivated teachers with both expectations are doomed to disillusionment, frustration, and failure, he says.

Educational Development and Developers

It appears useful at this point to assume that the most widely adopted educational developments, for the most part, do and must take place initially outside the classroom. Who does this? What techniques are employed? What kinds of development are involved?

To take the last question first, most exportable developments of wide potential use are products--instructional materials in some form or media, rather than theories or techniques. In the example cited immediately above from Borg (1970), the products are microfilms plus explanatory material, even though the purpose of the product is to implement a technique, microteaching. In the military and industrial prototypes cited, the same was the case. An instructional package, in whatever form, appears inherently more readily usable than does a concept or technique, such as individualized instruction. Thus while teachers and administrators may profit from information and data on new instructional techniques or on methods of planning and decision-making, it may require considerable formal training or inservice training for effective results. In contrast, many packaged and tested instructional products require a minimum of new training on the part of the user and, therefore, are readily exportable.

Now turning to the first question above, those who are currently involved with educational development are represented in three major areas: commercial publishers, sponsored curriculum development projects, and professional researcher developers. The techniques and procedures employed by each of those three sources are examined in the subsections which follow.

Commercial Publishers

Textbook publishers traditionally have supplied the bulk of instructional materials and resources for the classroom. Their model is essentially a market model--to produce products that will sell. While authors and editors may communicate with the users as to kinds of materials desired, basically the market determines what will be produced. In this sense, the materials sold implicitly determine the educational objectives of the courses in which the products are used. It would take an independent and enlightened teacher, indeed, to set his own objectives and use the products to attain them, rather than permitting the content of the products to set the (unspoken) objectives. Textbooks are often evaluated more on the basis of the accuracy of the information contained in them than upon the teaching effectiveness of the book.

Further, most textbooks are marketed without any prior assessment of their teaching value or instructional features. True, the author _may_ have "tried" the text in draft form in his own classroom, but without any rigorous empirical basis for evaluating the text. Diffusion or adoption of textbooks is typically based on the users' attitudes toward the content and format rather than upon its matching with explicit objectives or its teaching features.

Apart from textbooks, commercial producers also supply workbooks, films, and many of the newer media materials. But in spite of the publication of the joint guidelines (DAVI - ASL) suggesting the provision of teaching effectiveness data, few commercial products--including programmed instruction--have undergone the recommended formative evaluation and revision process.

It is predicted that proof-testing and the use of objectives and self-instructional and feedback techniques will not come into widespread use in commercial products until the purchasers refuse to buy products without these features. Then commercial producers could expect to reduce the redundant proliferation of materials in favor of fewer, high quality, saleable products because of a demand on the part of sophisticated users. If and when that day comes, a new relationship would be possible between education and industry, whereby educators set the objectives for materials to be produced to specified acceptability levels, with industry doing the development against prescribed standards. Then products which meet the standards would be purchased. The mechanism for doing this has been discussed elsewhere (Briggs, et al., 1966; Briggs, 1970b).

Curriculum Development Projects

In recent years, the availability of federal and private grants for massive curriculum development projects has resulted in a number of innovations in both the content and the methods for instruction. It is not possible to offer an evaluation of these efforts, but it is relevant here to comment upon the development procedures employed.

In general, such projects fall somewhere in between the methods of commercial producers and the methods of the three prototype programs described earlier in this paper. That is to say, most such projects have not followed a "systems" approach, as now widely accepted by many writers on development systems. See especially, Tosti and Ball (1969) and Briggs (1970a).

Specifically, these development efforts differ in how and when two crucial elements of the development are considered: (a) the objectives of the curriculum, and (b) evaluation of the program in terms of the objectives.

In one well-known science curriculum project it was judged best to formulate only the major philosophy or approach at the outset, leaving the materials writers maximum freedom to develop materials to encourage discovery and inquiry on the part of the student. Specific objectives were left to be developed much later in the program. While this procedure no doubt did enable the project writers much latitude in creative production, it posed an almost insurmountable problem when it was time to plan for the evaluation measures.

These two elements of development represent the crux of a genuine division of opinion among developers. This division finds expression most clearly in two opposing views of the merit of stating specific educational objectives in operational (behavioral) terms. While almost any developer stands somewhere on a continuum in this disagreement, the focus of the opposing views is shown in the statements of various writers. Prominent in advocating specific behavioral objectives developed early in a program is Mager (1962). Equally vocal opposition gives a warning against too narrow a treatment of educational objectives. The pros and cons of this division are becoming more widely understood and will not be reviewed here.

There is a way to take advantage of the merits of both opposing views. The key to this lies in the distinctions made by Berlak (1970) who points out that one may classify the actual outcomes of an educational program as (*a*) *intended*, (*b*) *anticipated*, (*c*) *unanticipated*. This suggests that one could (*a*) state the *intended* objectives early in the development, and plan evaluations of these; (*b*) then list possible other (*anticipated*) outcomes and plan to evaluate or watch for these; and, (*c*) then, after the program is in classroom use, look for any *unanticipated* outcomes. Armed with results and observations on all three types of outcomes, one could make decisions concerning the continuation, modification, discontinuation, or adaptation of the program. These procedures are incorporated in the writer's suggested "systems" model for the design of instruction (Briggs, 1970a).

A second curriculum development project may be contrasted to the one mentioned earlier. In *Science--A Process Approach* (AAAS, 1967), the objectives and the evaluation plan were developed early in the project cycle. While the fundamental assumptions or philosophical approach are in themselves controversial, being criticized by some (Atkin, 1968) and supported by others (Gagne, 1968), this project does contrast with the other one cited in respect to the specification of objectives and evaluation measures. Careful evaluations of student performance, both during instruction and at longer intervals, will provide concrete data in terms of attainment of the stated objectives, as well as feedback from students, teachers, and administrators. Thus, this project has avoided the uncertainties encountered when these two components are not planned jointly and early in the development cycle. This project illustrates the development feature of *congruence* among objectives, measures, and materials, a recommended aspect of a systems approach (Briggs, 1970a).

Apart from the differences among curriculum development projects in methods of development procedure, as discussed above, the procedures for production and diffusion of the products, and the nature of the products, may often be quite similar among projects. Typically, at some point after first classroom tryouts and revision, usually increasing in spiral fashion to include a greater number of tryout schools, the project development phase is considered completed. Commercial producers usually then join in to reproduce and market the products, which may consist of texts and workbooks for students, manuals for teachers, laboratory materials, films, sound tapes, or other media. From this point on, even though evaluative data may continue to be gathered, the adoption of the program rests primarily upon marketing strategy, subjective acceptability of the materials to users, and in some cases, the extent of special training opportunities or observations for teachers and administrators.

While many millions of dollars have been spent to support the massive effort required for such large curriculum development projects, often covering many grade levels, there is little basis for saying how much improvement has been brought about. In the opinion of Watson (1968), educators deserve evidence in place of advertising and selected anecdotes. He calls for more hard-nosed information about what happened to students exposed to the new courses--information about what students actually learned, what effect the personality and competence of teachers had on the results, and "what modes of classroom procedures led to what changes in pupils of various types" [p. 16]. He suggests that educators should not continue to be asked to accept the new courses because they were designed by "experts." He expresses surprise that, of all teachers, science teachers do not exhibit more of a "show me" demand for empirical evidence.

Another somewhat disconcerting fact is the lack of agreement among "experts" as to what should be taught, in whatever subject area (science, mathematics, etc.). When wide disagreement does exist, it suggests a need for a broader base of public involvement in the process, although the mechanisms for implementing this have yet to be worked out. It also suggests the possible need for "problems-oriented" curricula rather than "discipline-oriented" curricula, at least for some phases of public education. Work by model cities projects seems to move somewhat in these directions, planning a broader basis for the determination of the goals of the school system.

Professional Researchers/Developers

This broad category of workers may be found operating in a variety of institutions and organizations, including universities, private R&D firms, R&D centers and laboratories, and military, industrial, and governmental research and development agencies.

Many current professional researchers/developers share a common heritage--initial loyalty (by virture of their training) to some discipline, such as psychology, engineering, sociology, or education--and later identification with a "research-based development" strategy for educational change. This identification is commonly brought about by interim experience in organizations with a mission of development, such as those involved with the three prototype developmental programs discussed earlier.

These persons come to implement some development model which emphasizes primarily the development of instructional materials and strategies, often of a self-contained and largely self-instructional nature. They often begin their developmental interest as an incidental part of their research in programmed instruction or other of the new media. They also often begin by seeking to relate research findings to the development of techniques for effective instruction. In this respect, B. F. Skinner and programmed instruction have had an influence upon educational developments far beyond the specific applications of programmed instruction as a particular educational technique. Practitioners of programmed instruction realized (during the period of about 1955 to 1965) that the empirical testing and revision of programmed texts was a technique applicable to other educational media, leading to a redefinition of "programming" as the application of a particular set of systematic steps to the development of any instructional media or technique. It is this history which probably led to the coining of the term "formative evaluation," and certainly led the present writer to coin the term "formative design" (Briggs, 1970a).

While many refinements and methodologies remain to be worked out in relation to formative and summative evaluation and criterion-referenced measures, the brilliant work of Skinner in educational application was a timely event, arriving in a period of growing demand for quality education for all and increased accountability for the results of education. It would appear, then, that the future history of education will attest to the widespread effects of the work of Skinner and of such persons as were working in the "research-based development" role during the period of roughly 1955-65, and on into the present. The future may also make more clear the degree of permanence and realism of the points of view embodied in the systems approach, whose proponents so often have views conflicting with those of other educators.

In summary, it appears to the present writer that this rather heterogeneous group of research-based developers will, in agreement with Borg (1970), produce more successful educational innovation than has been produced by the strategies of local innovation or of educational research, per se. In part this may be due to insight into how to combine research, development, and evaluation; in part this may be due to single-minded dedication to system-oriented developmental models. Such an orientation may seem to most classroom teachers and educators as somewhat foreign elements in education--a far cry from interest in the teacher's role as a platform performer and heavy dependence upon evaluation of input and process rather than output.

A Consortium-based Model for Curriculum Development and Diffusion

Believing that past models provide insufficient concepts for bringing about timely and massive educational changes during periods of pressing public demand for change, and believing that the diffusion literature has taken too narrow a view of the potentialities of the research-development-diffusion model, the writer feels obliged to attempt the broad outlines of a more suitable model for the future improvement of instruction and curricula.

Assumptions

The basic assumptions upon which the proposed model rests are as follows:

1. The public will increasingly press for major changes in education in the future.
2. This will lead educational and R&D agencies to form consortia to bring about agreed upon changes, to be adopted by the agreeing parties.
3. Such consortia may involve a relatively local community or larger regions of sizes varying up to several states.
4. The lay public will be heavily represented in such clusters of organizations, and will exert decision-making power.
5. The goals identified will be based upon a broad review of current societal trends and predictions of future educational needs.
6. The goals chosen will require massive new development and evaluation efforts, of an integrated rather than piecemeal nature.
7. Advance commitment to the chosen goals will insure installation of the resulting developments in the participating schools when sufficient evaluative data so justify.
8. The necessary development efforts will require new working relationships between education and industry. While education (including R&D agencies) will take the lead in specifying the products needed to reach the selected goals, industry will continue to play a major part in the development, production, and distribution, but relating to products specified by education (Briggs, 1970).
9. As a consequence, adoption and utilization are planned and agreed upon in the beginning by all participating schools in the consortium. When the results of a number

of such consortia efforts are available, other localities not having participated in any consortia are free to adapt the products and techniques used in any desired consortium effort through cost sharing arrangements for amortization of development costs.

10. The preceding step will require initial support for consortia by arrangements among several levels of government and private industry.

It is the writer's belief that such a series of events represents the best hope of changing education fast enough and responsively enough to avoid increasingly chaotic conditions in the public schools. The proposed means for change will test the ability of people to work together and will require excellent leadership and management. But the writer believes that past methods of attempting to effect educational change on a widespread scale are not adequate for the future.

Steps of the Model

While the general stages of work to be done by such consortia as those proposed may vary considerably, the following series of steps is proposed as one feasible model.

1. Setting of educational goals. This is in general the problem of looking toward the future in an attempt to foresee the kinds of education which the adult citizen of the future will need, and working backward from that to scope and sequences of curricula that would meet the need. Doing this, of course, carries with it likelihood of errors in estimate of the future, but it also requires serious consideration of values. That is to say, some fundamental decision will need to be made as to whether the educational goal is to develop citizens capable of transforming society, or to help them adjust to some predicted society. Few would opt for the transmission of our past culture as the only goal. While there are too many philosophical and ethical questions to pursue this step further here, coming to grips with such values and goals must be a major starting point. An anticipated major source of variation among consortia is the particular mix of attention to National goals, State goals, or more specific regional or community goals. Perhaps the first and foremost test of the feasibility of a consortium is the ability to reach sufficient consensus upon the goals to be adopted. Certainly, new mechanisms are needed for securing the broad base of community and other participation that is needed at this stage. A few mechanisms and suggestions have been offered by the writer elsewhere (Briggs, 1970b).

2. Translating goals into objectives. Once the goals are selected for whatever school or school-related systems are participants in the consortia, these general goals must be broken down so as to yield year-by-year articulated objectives. Such objectives need to be specific enough for designing the yearly instruction, or at least by cumulative stages, so that at the end of the schooling the goals are met, in so far as their evaluation does not refer to postschool, adult life. It is likely

that several intermediate stages of goals and objectives need to be derived to work downward from ultimate (lifelong) goals to objectives which are specific enough to guide the instruction at a particular age or grade level. Now that we are in a time for the reform of curriculum objectives, it can also be anticipated that there will be a demand for new objectives.

3. Identifying the enabling objectives. Once the objectives for a particular stage or year in the educational process are defined, normally it is necessary to study the component parts of each objective. These component parts are often called "enabling objectives." Gagne (1970) refers to them as "subordinate competencies." Study of such component parts helps in planning the instructional strategy for the objectives. In many instances, e.g., for hierarchically structured component parts, the analysis will help determine the sequencing of instruction for the objective as a whole. At least this appears to be the case for objectives representing the attainment of intellectual skills (Gagne, 1970; Briggs, 1968b, 1970a).

From this step, onward, writers have disagreed considerably as to the developmental steps to be taken. Indeed, there is some disagreement as to whether the instruction should be planned by any series of steps. However, this matter pertains to differing development models, while in this portion of this paper we are attempting to outline an entire development and implementation effort, that is, a full cycle formative evaluation, tryout, installation, summative evaluation process. The remainder of the steps enumerated here approximate a plan previously described (Briggs, 1970a).

4. Classifying the enabling objectives. In the approach recommended here, each subordinate competency (or enabling objective) for cognitive or intellectual skill objectives is classified as to type of learning, according to Gagne's (1970) taxonomy. (Gagne's taxonomy is preferred over others because he also identified the conditions of learning for each category.) For affective or psychomotor skills, other taxonomies might be more useful, requiring also perhaps some deviation from the next few steps as they are outlined for cognitive skills.

5. Identifying the assumed entering competencies. The reason for this step appearing late in this sequence is that a very specific basis exists for stating entering competencies relevant to the objectives. Analysis of an objective as described above leads to identification of both the enabling competencies to be learned, and the closely related competencies the intended learners are expected to possess as entering competencies. Other more general competencies also may be noted.

6. Adjusting to actual entering competencies. Any discrepancy between the assumed entering competencies and the actual entering competencies of a given learner can then be detected by the development and use of pretests over the assumed entering competencies. Deficiencies so detected can then be dealt with by any of several means: (a) remedial instruction, (b) branching programs, (c) reassignment, or (d) modification to the learner's program.

7. Preparing posttests. For various purposes, posttests should be prepared at several levels: (a) at the subordinate competency level for diagnostic and remedial purposes; (b) at the level of the objective, to monitor pupil progress; and, often, (c) at the unit and end-of-course levels for both formative and summative evaluation of the program. In fact, all three levels of testing are useful for formative evaluation, supplemented by even more frequent testing in the case of programmed instruction.

8. Listing the conditions of learning for each subordinate competency. Gagne's (1970) treatment lists conditions of learning desired for all instruction as well as those needed for each type of learning. The age and sophistication of the learner may determine how, when, and how often to employ each condition. Both the general and the special conditions are then consolidated into one teaching sequence, which the present writer refers to as the instructional events to be provided.

9. Choosing between group vs. individualized instruction. There are many considerations which may go into the making of this decision. Often various competencies or objectives may be assigned to the two different kinds of instruction. At any rate, these decisions affect the selection of the media to be employed.

10. Selecting media. Different developers select media at different degrees between microchoices and macrochoices. That is, different developers choose the media of instruction for different sizes of "chunks." The preferred size of "chunk" could also change the point in the design stage at which the choice is made. While further research is needed on this matter, the writer prefers the "microchoice," that is, the selection of media for specific instructional events for each competency of an objective. The details of how this may be done are elaborated elsewhere (Briggs, 1970a).

11. Writing the prescriptions. This is a critical step, especially in a large team effort. No matter how closely the design has followed the above steps, or how far it has departed from them, it is at this point that the educational designers communicate to the developers just what items are to be produced, in which media, to what specifications. Some of the kinds of details which might go into these prescriptions are found in the reference cited in the previous step above.

12. Developing first draft materials. This may also involve a large team effort. In any case, it is here that the "prescriptions" are "filled." This consists of a first design of all materials in all media specified in the prescriptions.

13. Conducting formative evaluations. Either brief portions of materials or entire "course" segments are tried out with appropriate individuals or groups. The assumed prerequisites must be assured where tryouts of smaller segments in mid-course are made. Tests are administered at the various levels discussed earlier, and cycles of revision and retesting are conducted until the design criteria are met. Those criteria are a part of the detailed statement of the objectives (Step 2). When design criteria are not invariably met after successive revision, decisions need to be made about the economy of further revision versus changing of standards or other alternatives.

14. Providing summative evaluation. Often this would not be done as a single step, but in the form of a limited field test, then more extensive tryouts, then decisions as to acceptability for "operational cutover" or "institutionalization."

15. Monitoring and diffusion. As said earlier, assuming that the evaluations indicate that design criteria were met under field test (normal school) conditions, it is assumed in this model that all cooperating schools adopt the program. In any case, continuous monitoring is desired. In this sense, diffusion among participating schools in the consortium was assumed at the outset. Previous comments were made as to how diffusion beyond the consortium might come about.

16. Training of teachers. The role of teacher training has been left as a late entry here because of earlier predictions made as to the future improvement of teacher training. Were this not assumed, teacher training would come at an earlier point. In the ideal consortium of the future, the teachers would have been trained in current and expected new techniques during preservice training, and so might need a minimum of special training as the program develops. Under less ideal conditions, the inservice training would begin early and continue through orientation, observation, discussion, etc.

17. Permanent reassessing of needs. In the ideal consortium, the group effort would not cease with implementation of the program. A small team would continuously scan the horizon of the future, comparing these observations with the nature of the ongoing program. By such continuous monitoring of the program and forward search, the consortium might avoid the need for such a major overhaul as that just completed. Continuous adjustments should replace future major problems, upheavals, and need for emergency measures.

Discussion of the Model

Many secondary considerations have been omitted from this description of the model. For example, one reason for continuously monitoring the program is to detect unexpected or unplanned outcomes of the program. In fact, even at an earlier stage, detection of "emergent or expressive objectives," as distinct from the "planned objectives" is a desirable function of evaluation efforts.

While some details of the recommended development and diffusion model would need to be changed for affective or psychomotor objectives, the writer would argue that the validity of the overall systems model is as likely for these as is its validity for cognitive objectives. However, fewer examples now are available of its application to the former domains.

While specific attention is not given in the development and diffusion model to effective, emergent, or unanticipated outcomes of instruction, the utilization of formative and summative evaluations makes the model at least potentially sensitive to such outcomes.

It is further recognized that the model presented does not obviously espouse "humanistic" approaches to curriculum design. But there is no reason to suppose that a system-oriented, consortium-conducted model for the development and diffusion of curricula cannot be humane. On the contrary, the recommended broad base of societal input to consider the desired values and goals goes far toward building humanism into the system. Once the system is in operation, a single tyrant in charge of a classroom might be more easily detected.

As an example of a "systems" type of approach, the suggested model may be fairly representative of other "systems" models as presented by other writers, especially at the opening and closing steps outlined. But in Steps 3 through 10, the details of the model as given here may not be representative of other systems models. These steps involve the issues of how course structure and sequence are handled, how instructional strategies are developed, and whether media are chosen at the microlevel or the macrolevel.

It may also be observed that the model presented here assumes a large team effort, using more sophisticated and specialized personnel than would be available in some more limited development efforts. It also assumes the probable validity of varying instructional strategies in accordance with different types of learning, as reflected in Gagne's (1970) taxonomy.

The model also focuses upon preparation of predesigned instructional materials as a key resource; it assumes extensive use of self-instructional materials and individualized methods of instruction. It presupposes that some day the inservice training of teachers will lead teachers eventually to welcome such resources, and to develop teacher roles compatible with such tools for learning and instruction.

Since it focuses upon the above assumptions, the development model presented here does not say much about the learning environment and context, or cost-effectiveness, or roles of people. Under the consortia arrangement proposed, both management models and context models would be dove-tailed with the development and diffusion of curricula. And cost-effectiveness cannot be compared to present education, whose effectiveness is mostly unknown. Where there are no objectives, almost any evaluation is suspect. But there is precedent for asserting that the large development costs of a systems-based development and diffusion model often amortize out in a highly satisfactory way. In any event, the model, emphasizing objectives and evaluation, lends itself to determination of both cost and effectiveness.

Some Elements of Success for the Model

Whether one agrees with either the underlying assumptions of the recommended model, or with the model itself, the question of its feasibility is a necessary one to raise. Apart from the obvious cooperative and joint actions among many kinds of organizations, society, and government, what else would it take to make it work? Several possible elements for success, other than those already discussed suggest themselves:

1. More face-to-face contact among innovators, teachers, teachers in training, industry, school, and society.
2. More planned mobility and communication, visits, demonstrations, and other interchanges so that the basic outlines of the model and possible innovative changes are made aware to all these groups.
3. Much more use of visits, demonstrations, team teaching, visiting teachers, and the like for learners, teacher trainees, teachers, researchers, developers, and all concerned in a consortium effort.
4. A better mix of formal, on-the-job, and real-world learning experiences for teachers, professors, and other personnel.
5. Open critique of the consortium effort as to management, organization, procedures, and results, so that the entire concept could be changed to make it more effective.
6. Much communication among member institutions of the consortium, policy research centers, government agencies, and the public, not only in the planning phases, but permanently.
7. Continuous study of the child, the school, and the society, with the view of reaching new insights to improve future practices.
8. A reappraisal of the function of the university in society, with special regard for the optimum ways to accomplish research, development, teacher training, evaluation, and diffusion.
9. Introduction of trainees in the RDD&E process, and constant trial and evaluation of how to coordinate their training in a meaningful and efficient context.
10. Continuous rethinking of the research, development, diffusion, and evaluation roles to be played in the consortia. The training of RDD&E specialists offers many challenges as to needed future function and context of function. While study of the RDD&E functions in the present contexts in which this work takes place is a necessary effort, the matter of planning the future training of these specialists requires the same looking to the future as recommended here for development and diffusion of effective procedures and products for all education.

Organizing for Change

One of the implications of the recommended model is the need for careful attention to organizational structure, management, and leadership. In the proposed model, diffusion is by organizations rather than by individuals. This very fact does indeed call for methods of control and the development of flexible management structures, policies, and techniques to coordinate the work of many persons. Better than usual coordination among organizations will be required.

It is beyond the purpose of this paper to suggest how educational institutions need to change. Implicitly, however, we have suggested that some educational changes need to involve either new institutions or new cooperative arrangements among present institutions, or both. No doubt other needed changes are changes in goals, bringing about a need for new curricula, and new methods and materials. We have also suggested that we believe the public will require changes, or will create new institutions as an alternative.

Mechanisms for more meaningful ways to arrive at goals are greatly needed, as well as ways to progress from goals to objectives. For too long the lofty goals of education have remained unrelated to the curricula.

It is not at all clear to the writer whether the future changes in education will consist more of changes in organizations, or in goals, or in curricula, or in methods and media of instruction. No single breakthrough in any of these areas seems to suggest the future direction.

The proposed consortium-based model for curriculum development and diffusion does provide a systematic method for monitoring the congruence of the educational methods and evaluations with the objectives. Unless these three major components of the process are compatible with each other, no evaluation and, hence, adaptation is possible. In the words of Mager (1968), we need to ask: "Where am I going; how shall I get there; and, how will I know I've arrived?" (p. 7).

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A CRITIQUE OF THE PAPER

Norman J. Boyan

University of California--Santa Barbara

Author's Aims and Intentions

Professor Briggs' primary aim is "to present *a view* of development and diffusion activities that will assist in making them more effective for the improvement of education." (p. 144, italics added). His secondary aim is to describe *selected* considerations that prompt him to advocate his preferred "model" of educational development and diffusion activities. His intention is to offer "a *selective* and *illustrative* view of the purposes and means of educational development and diffusion as they have taken place in the past, as they are currently practiced, and as they might occur in the future." (p. 145, italics added). He disclaims any intention to produce a comprehensive review of the state-of-the-art in educational development and diffusion.

Summary of Critique

The author does achieve, in part, his primary aim. His advocacy of a systems-oriented, consortium-based "model" incorporates his view of how to make curriculum development and diffusion more effective. However, he offers only a bare outline of a "model," not a working drawing.

As for his supporting aim, he does, indeed, present *selected* considerations that compel him to propose the consortium approach, but his presentation is so selective that the reader who expects a detailed topographic map of both educational development and educational diffusion comes away disappointed. He finds, instead, an outline map of the two domains, without sharply defined relationships between constituent elements and without clear indication of the four compass points. In addition, the reader who seeks a strong conceptual bridge between the peaks of educational development and educational diffusion comes away dissatisfied. He finds, instead, a set of building materials, without clear assembly instructions and without assurance that the assembled pieces will reach from one peak to the other.

The paper suffers from a number of substantive deficiencies, weak organization, and uneven presentation. Overall, the major *idea* of the consortium-based approach commands more attention than the *arguments* advanced in its behalf or the rudiments of proposed structure and operation of the "model."

Directors of the Oregon Studies project must share responsibility for the paper's modest success. They commissioned too large a task. They would have pursued a wiser course by seeking two separate papers, one on development and one on diffusion, allowing the authors to treat the boundary lines as permeable where appropriate to support arguments and views of how these domains do or should relate to each other.

The author implicitly recognized the enormity of his assigned task when he presented his statement of what he intended and what he did not intend to do. He deserves credit for the legitimate attempt to narrow the scope of his paper and for his partial achievements. Still, the paper's shortcomings diminish the value of its positive contributions.

Analysis of Major Thesis and Supporting Arguments

Professor Briggs' essential thesis is that a consortium-based, systems-oriented, research-based development "model" stands superior to other approaches for producing and installing the "timely and massive" improvements required in education today and tomorrow. The twin emphases on high quality development work *per se* and on need for effective change in educational practice dominate the author's arguments. His stress on the critical nature of the linkage between development and diffusion deserves high commendation.

Identification of the main lines of argument, as presented below, require the reader to consolidate, at times, points appearing in several sections of the paper. In the analysis of arguments, the voice of Professor Briggs will be identified when he is speaking; otherwise the critiquer's voice will be heard.

Compelling Need and Great Public Demand for Change

Great public demand and compelling need for "timely and massive change" in education appear as givens in a series of badly assertive statements scattered over the paper. Commonly available opinion, information, and hard data offer support for the "compelling need" position. Despite the author's omission of specifics, little basis exists for criticizing his categorical stance on the need for change. Indeed, he could well have stipulated the need-for-change as a given or a basic assumption in the very beginning and left it at that. The additional references to the need serve no constructive purpose.

The author sets great public demand for change as the other side of the compelling-need assumption. The relevance to his thesis of the public demand issue falls into two categories. First, he says, the means now available cannot deliver the kind of change (timely, massive, integrated, responsive) the public really desires. In his view, the public's readiness to consider the establishment of new institutions for education and schooling, its press for quality education for all, and its emphasis on accountability show how determined it is to secure the changes which will fill its wants. If presently available means are inadequate, new means must be created; for example, a consortium-based arrangement for curriculum development and diffusion.

Second, continues the author, "the public" does and should serve as the legitimate source of goal definition for education. Lay involvement desirably encompasses reviews of current social trends and alternative educational futures, presumably generated by specialists. However, the public will and should exert decision-making power. The proposed consortia attend properly to this requirement.

The author does not make clear whether the public decision-making power will be exercised directly or representatively in goal-setting; whether public power in a consortium will be exclusive or participatory. Since details never appear on exactly how the public will participate or be accommodated in the proposed consortium arrangements, the contribution of the argument on public involvement to the author's central thesis falls short of any useful mark.

Moreover, his notion that public participation may helpfully contribute to reducing divergence among experts on what should be taught, and by implication on the goals of education, is naive. The messages of students of the politics of education unequivocally point to absence of consensus among lay citizens as one of the root causes of lack of ability to state educational goals with any precision and to reach fundamental agreements thereon. These students tell us that the public does not exist. Rather there are several or many groups who come to the decision-making table with different desires, wants, intentions, and preferred practices as well as goals. The author recognizes that the resolution of these differences is crucial, but offers no indication of how his consortia would promote the needed resolution or achieve consensus on goals.

The proposed division of labor between "public" goal-setting and "professional" objective-setting is an important ingredient in the author's thesis. For it is, in part, the public's direct legitimation of goals and indirect legitimation of objectives that undergird the expected advance guarantee by practitioners to adopt products generated by developers, when the products meet preset design specifications. The agreement-in-advance to adopt products serves as the main pillar of the diffusion capability of the proposed consortia.

Unfortunately, the author ignores the fragile nature of the government and governance of schools and other educational agencies and the hazard of treating advance agreements as very stable outside of a specific contractual arrangement. His advocacy of a consortium as an instrument of diffusion appears, therefore, to rest on a rather frail reed, unless he meant to incorporate a contractual base into the consortium's practices. He might have dispelled the sense of frailty if he had drawn his picture of consortium structure and operations in more detail.

Consideration of "Mechanisms" for the Process of Change

The author briefly examines the following mechanisms: the aroused society, the concerned community, the local classroom teacher, the researcher, industry, and a combination of educational and research institutions coming together in a consortium which incorporates the public, industry, and possibly state and federal agencies. The cursory treatment of the first five serves as a foil for the conclusion that a new device is needed which allows the public to set general goals, professional educators to translate the goals into derivative product specifications, and industry to produce the desired products. The only alternative mechanism considered is the proposed consortium.

The cryptic treatment of the inadequacies of the five other mechanisms brings the reader to his first meeting with the consortium in a hostile frame of mind. The summary table only exacerbates the hostility. If the author had incorporated the references to the advantages of the consortium approach into his later discussion of his preferred model, there would have been no reason to include this section in the paper.

His brief look at the process of change serves approximately the same purpose as the treatment of mechanisms; namely, a foil to make a point and an opportunity to make some foreshadowing remarks. Both the point and the remarks prove to be redundant.

Lack of Future Orientation of Literature on Diffusion

The comprehensiveness of the material included in the volumes recently published by Havelock and his colleagues lends validity to the author's stance of treating these reports as a proxy for all literature on diffusion. His use of the Havelock reports leads him to conclude that the existing literature looks back, around, and not much ahead; it is not enough future-oriented; it serves as a poor predictor of what educational diffusion could and should be; it implicitly assumes permanence of the status quo.

The author cites five specific "possibilities" grievously overlooked by extant literature as potential sources of future changes. These "possibilities" include potential changes in teacher preparation to equip practitioners to be more responsive to innovation, the likelihood of strongly increased public pressure for rapid and massive change, the promise of multiorganizational arrangements to produce and to install desirable change, the emergence of new kinds of schools, and powerful new discoveries. The value of the citation resides more in its utility for exposing additional dimensions of the prepared consortium "model" than in its substantive power.

Inadequate Treatment in the Diffusion Literature of the Research-Development-Diffusion Model

The gist of the author's argument here is that the scholars and students of diffusion have poorly represented the optimal linkages between research and development on the one hand and between development and diffusion on the other. Unfortunately, the categorical assertions that Havelock, et al., standing as the proxy, differ in their view of the research-development-diffusion model from the author do not receive sufficient documentation to make the difference explicitly clear. The equally categorical assertion that Havelock's reports neglect some important features of the research and development process and its connection to diffusion also stands weakly supported.

The only specific criticism offered of Havelock's treatment is his overemphasis on the linearity of process and direction of flow in the research-development-diffusion model. Even this criticism comes after acknowledgment that Havelock, et al., do note the importance of feedback and redesign. An implied criticism appears in the discussion of the "possibility" of changes in teacher training to the effect that "the research-development-diffusion model is regarded (in the diffusion literature) largely as an intrusion of outsiders with products to promote, whether or not these products are ideal solutions for the problems to be faced" (p. 156). By implication, the author is more concerned with solutions than with intrusions. Another implied criticism is that students of diffusion overemphasize the adoption and spread of innovations whereas the author weighs development per se more heavily in considering the several components of the research-development-diffusion model.

In brief, the author leaves the reader on his own to compare and contrast the Havelock, et al., treatment and the Brigg's conceptualization. This is a weak and cavalier way through which to support a main line argument for the thesis.

The superiority of tested products over the utilization of knowledge as a direct source of change represents one of the major differences in perspective between the author's view of the world and the view commonly expressed in the diffusion literature. The proposition enters early and receives continuous stress. It is central to the over-all position adopted and advocated by the author, along with his concern for introducing well-developed products into effective classroom use on a widespread scale. He sees "inherent" advantages in products, especially those which come in the form of complete instructional packages, because of minimum requirements for additional training of intended users. By implication, adoption and exportability are inversely proportional to the amount of additional training required.

The power of instructional products as an instrument of diffusion and of improvement of education, as compared to the use of other strategies and tactics, is an appealing argument to almost anyone who has come close to rigorous development work in recent years. The appeal of the argument itself, however, does not compensate for omission in the paper of documented evidence to support the basic proposition. The author simply does not parade sufficient support for his case in his citation of the three prototypes and in his description of the work of commercial publishers, curriculum-development projects, and professional researcher-developers.

Research-based Development Strategy vs. Local Invention and Innovation

Another building block in the author's construction of the consortium-based "model" is the argument that a rigorous research-based development approach offers more hope for producing and introducing tested improvements over a wide base than an approach which anticipates the invention and diffusion of meaningful innovation by classroom teachers.

Again, the line of argument appears early and emerges often. Supporting assertions include the following: the innovations developed by teachers are not likely to move into widespread use because there is no handy organization to diffuse them; the dissemination efforts associated with local teacher-made innovations, like those of researchers, have not proved spectacularly successful; "precious few improvements" come from efforts to persuade teachers to try to adopt procedures which are applications of research findings; "cajoling, pleading, coaxing, and explaining" do not work because the efforts are too far out of context for most teachers to make the application; engineering by professional researcher-developers is needed more than translation; dependence on isolated practitioners of diffusion (change agents) will not generate widespread and significant change; it is a misconception to assume that teachers' utilization of research findings will lead to educational change; attempts to disseminate research findings in raw form to the classroom teacher constitute an "exercise in futility"; local innovation may be a good source of new ideas but it rarely serves as more than a seed for potentially successful development; most local innovations are never successfully used by anyone other than the original developer; the low level of exportability of local innovations is associated with the characteristics of lack of rigorous evaluation, of inefficiency, and of expense; teachers who aspire to be inventors as well as practitioners "are doomed to disillusionment, frustration, and failure."

The asserted deficiencies of the local innovation strategy serve to introduce counterpoints, either explicitly or by implication, to support the author's choice of the research-based development strategy for improving both the production and diffusion of educational improvement. For example, translators of research findings are less important than "educational engineers who can apply research findings in the design of workable (and testable) products, techniques, tools, or instructional packages" (p. 149). A consortium approach will generate more widespread and significant change than isolated change agents. The technical superiority of research-based development stems from its emphasis on continuous formative evaluation and revision of products or techniques until design specifications are met. Its strategic superiority stems from ability to make delivery in user-ready form on a wide scale.

The contrastive approach allows the author to draw the conclusion that research-trained developers are likely to be the most productive users of research knowledge, which they have the competence to convert into instructional products, and that teachers are likely to use most productively information about products and techniques. The separation of functions and division of labor to which the author's line of argument addresses itself constitute key foundation stones on which he builds his proposed consortium.

Experienced observers of attempts to introduce worthwhile educational innovation will tend to agree with the view that the "best" users of research knowledge are professional researcher-developers; certainly, they appear to represent a more reasonable user group than classroom teachers. Equal support will come for the notion that local classroom teachers are better users of information about tested products and techniques than of either raw or translated research knowledge. Even so, the reasonableness of the author's position could have been strengthened if he had depended less heavily on the views of only one other practicing educational developer.

Examples of Prototypes of Development Work

It is important for the reader who really wants to understand Briggs to note clearly the operations and activities which receive praise in the cited military, industrial, and educational prototypes. He uses the examples primarily to identify the following guidelines for successful development work: clear definition of training goals or objectives; classification of learning tasks into types of learning and their conditions; careful sequencing of instructional units and hierarchies of skills; use of the new media and media selection; integration of the components into an overall systematic procedure for the design of instruction; minimal new or additional training of users; the importance of performance testing for revision of first draft materials, for determining requisite entry knowledge, for achieving congruence between objectives and materials, for discovering where learning time can be saved, for verifying instructional sequencing and media effectiveness, for checking omissions in content, and for improving overall program effectiveness; the importannce of a continuous cycle of evaluation and revision. The industrial and educational examples indicate the great potential for reasonable amortization of high initial development costs through widespread adoption by a large number of users.

The author also cites and emphasizes the value of development to stimulate and feed research, as well as the more expected vice versa; the strong dependence of implementation and utilization on the production or availability of thoroughly "completed" products or processes; the notion that adoption and diffusion are inversely related to the amount of additional training by the intended users; and the superiority for diffusion in education of completed products over knowledge in its raw form.

The discussion of the military and industrial prototypes represents the most confident and plausible part of the paper. The author has provided nicely sketched examples; in each case it is evident that he knows the territory. The presentation of the educational prototype suffers because of lack of detail and the allocation of most of the space to comment on the inadequacies of the local innovation strategy as compared to the research-based development strategy.

The presentation of the three prototypes would have profited enormously from a crisp summary of the dimensions of successful development work which the author applauds in each of the examples. It is just possible that if the author had taken this step, he would have recognized the redundancy between much of his argument on development in the prototypes section and in other parts of his paper, particularly the so-called

"Steps of the Model."

There is need also to examine what the author does not say about the examples he has used. Each addresses itself to the training of personnel. Training per se takes precedence in these examples over content or knowledge per se. The basic orientation held by the author may prevail only or primarily when developers address themselves to the specific training of a known target group rather than the education of more diverse groups. A real burden of proof on this score rests with the author. The issue here is an authentic one, but receives no systematic consideration, not even in that section of the paper on "Educational Development and Developers" where the opportunity to cope with the matter readily presents itself.

The Professional Research-Developers vs. Commercial Publishers and Curriculum Development Projects

The author's criticisms of the commercial publishers stress two points. First, they use a market model of development and diffusion that caters to users' attitudes about content and format rather than a desired match of products with explicitly defined objectives. Second, few commercial products ever undergo an appropriately high or rigorous enough process of formative evaluation together with continuous revision based on achievement of specified objectives.

Foundation- and government-sponsored curriculum development projects deserve credit, notes the author, for the introduction of much innovation into education, in both content and method. The primary weakness of curriculum development projects, he observes, is that they have not sufficiently used a systems approach to achieve a congruence of objectives, measures, and materials.

The "good guys" are, of course, the professional researcher-developers. Explicitly and categorically the author declares that the professional researcher-developer group will produce more successful educational innovations than any other group. "In part this may be due to insight into how to combine research, development, and evaluation; in part this may be due to single-minded dedication to system-oriented developmental models. Such an orientation may seem to most classroom teachers and educators as somewhat foreign elements in education--a far cry from interest in the teacher's role as a platform performer and heavy dependence upon evaluation of input and process rather than output." (p. 167)

The value and contribution of the line of argument are mixed, at best. An example or two to document how commercial products do, in fact, fall below a desired norm of formative evaluation and revision would have been more convincing than the generalization which appears. The author's discussion of the genuine division across curriculum development projects of the merits of stating objectives in advance and in operational terms is a useful contribution. People who have been close to curriculum developers stand well aware of the power and virulence of this rift as pertinent to funding decisions and reputational status. The view that broader public involvement may assist in reducing divergence on educational goals and objectives, as already indicated, betrays naivete. The suggestion that use of "problems-oriented" curricula rather than "discipline-oriented" curricula may help to increase consensus on goals and objectives lacks any real meaning because there is no indication of what either looks like or of how the differences between them translates operationally into achieving greater agreement.

Even if the reader is inclined to agree that the professional researcher-developer group will produce more successful (that is, appropriately tested and widely adopted) innovations than other classes of developers, the author must still be faulted because of his tactic of exposing the weaknesses of others while stating only the strengths of his preferred group.

One of the more pertinent aspects of the consideration of major classes of developers receives no consideration. Descriptions of the sponsored curriculum development projects and of the work of professional researcher-developers suggest, but without pointed reference, that the latter tend to be more centrally concerned with *instructional delivery* while the former group tends to concentrate more heavily on *instructional content*. Students of educational development know that this distinction really exists. They further know that the bridge between the two groups remains unfinished; in some places, indeed, its building has not even been considered. The author could profitably have explored desirable rapprochement to indicate how he expects to cope with the distinction in his proposed consortia.

The Consortia-based Model for Curriculum Development and Diffusion

The culuminating argument for the consortia-based "model" appears in the statement of a set of 10 "Assumptions," 17 "Steps of the Model," 10 "Elements for Success," along with a brief "Discussion" and a few observations on "Organizing for Change." The way in which the author chooses to organize and present his case does not provide a neat, crisp, and clearly articulated description of structure or operation of the "model." Specifically, the "Assumptions" and "Some Elements for Success" have more in common with each other and with several of the "Steps" than they are represented. They would have carried more weight together than they do separately.

The assumptions really consist of a set of anticipated and desired conditions. The author himself uses the following words: ". . .such a series of *events* represents the best hope of changing education fast enough and responsively enough to avoid increasingly chaotic conditions in the public schools" (p.169; italics added). The simplistic cause-effect relationship between the first two "assumption-events" is definitely moot. Exactly why the author believes that strong public press for major changes in education "will lead" necessarily to the establishment of consortia, involving educational institutions and R&D agencies, deserves much more considered explanation and justification than ever appears. A set of "assumptions" of such strategic importance to the central thesis of the paper can not legitimately be left so barren of support.

The other assumption-events supply inadequate clues to the scope and operating conditions of the proposed consortia. For example, despite the obvious implication of a contractual obligation in the operation of a consortium, the author never specifically mentions contracts or the question of what might happen if the developers cannot produce or the operating agencies decline to adopt. The issue of appeal routes or adjudication receives no attention.

The "Steps of the Model" represent a similar mixed bag of 17 statements, with brief and close to cryptic explanations. The cryptic feature of the "steps" material shows itself in the number of "elsewhere references." On no less than six occasions the author uses such statements as, "The details of how this may be done are elaborated elsewhere (Briggs, 1970a)." Four of the "steps" (1, 15, 16, 17) really pertain to the operation of the consortium. The other steps pertain to the sequence of operations in the author's idealized process of development work.

The entire paper would have prospered, and the reader would have benefited, if all of the references to the preferred style of development work had appeared in one place rather than scattered over the sections on prototypes, major classes of development workers, and the model itself. Had the author brought all of this material together, he might have more successfully and convincingly indicated why his preferred style is superior to others.

Similarly, the paper would have been stronger if the author had collected in one place all of his major references to the proposed consortium approach. He might have then seen the need to offer a more detailed treatment of how a consortium would actually work.

One area where the author especially owed the reader much greater clarity is on the relative contributions of the consortium proposal to development *qua* development and to diffusion *per se*. In his own "Discussion of the Model," he bounces back and forth from one domain to the other. Simply put, the arguments and case presented by the author really never make clear whether the consortium will contribute primarily to the improvement of development work or primarily to the adoption of tested alternatives on a widespread scale or equally to both. It can be assumed, on the basis of a number of explicit and implicit statements, that the author wants to see improvement in both development and diffusion in order to enhance their effects on securing improved practice in the schools. The way in which he presents his case, however, tends to leave the reader with the feeling that the consortium approach will really help diffusion more than development and production. It is hard to see how the nondeveloper participants in the consortium will make any real contribution to development *qua* development, unless it is in goal-setting, objective specification, and sites for field testing. None of these activities really require a consortium for their presence in development work *per se*.

Concluding Statement

When the reader finishes the paper, he will find he has learned something about educational development, especially if he is willing to work at pulling pieces together on his own; something about educational diffusion, but less than he might have elsewhere; and not enough about what the author really means by "a consortium-based model for curriculum development and diffusion." The "model" never appears as a complete entity. The paper as a whole is particularly disappointing because the *idea* of a consortium based on multiorganization arrangements and affiliations possesses great appeal for audiences seriously committed to improving both development and diffusion and, in turn, educational practice.

Response to the Critique

Leslie J. Briggs

Since a page limit has been set for my response to the critique, I cannot possibly reply to all of the critical comments. This is just as well, since so many of the criticisms made would be useful mainly if a new draft of my paper were planned, but such is not the case. The critique includes many suggestions for more documentation here, less documentation there, etc.

I am as disappointed in the critique as the critic is disappointed in my paper. I thought the purpose of the critique would be to suggest better solutions than I have suggested, rather than to suggest how the paper might be rewritten.

The critic does not suggest a better solution to the problem, nor ways to make the recommended "model" work better. He asks for blueprint details while we are still in the first stage of architectural planning. If he chooses to call the recommended "model" an "idea" instead of a model, I don't quarrel with this. I did not set out to solve all problems and to supply all details of problem solution.

Nor can I fail to agree that it is hard to get consensus in a pluralistic society. I only suggest trying to. No political party and no national leader has solved this problem.

But I do predict that in the near future, the Office of Education will receive several proposals based on the consortium approach. It is for the authors of such proposals to spell out the mechanisms. I have no obligation to do that in the present paper.

The critic complains of too loose a depiction of the relation of development to diffusion, and he even objects to references made to sources of more detail on the development side. He says there are better sources on diffusion, but he does not name them.

As a historical fact, my paper was commissioned after the project leaders decided that the first drafts of the other papers did not represent adequate coverage of development and diffusion. So with a late start, and no written feedback, I wrote two drafts of my paper, subsequent to which the project staff put the two drafts together in the present form. I appreciate this contribution by the project staff, and I absolve them from any responsibility for the present content of the paper, as they did not change the substance of my own two drafts.

The weaknesses in organization of the paper, so prominent in the criticism, would have been even more pronounced without the help of the project staff during a period of illness and other scheduling problems.

So my major question to the critic and to the reader is: "Can you propose a more viable model for development and diffusion?"

Since no rewrite of the paper is intended, as the critic was aware, and since the proposed "model" is my suggestion for the future, it is for the future to prove whether the model will ever be tried out, and how well it will work. No further debate can settle this question, although I do plan to conduct a Delphi study to see how educational decision makers react to the feasibility of this model for the future as compared to the other models reviewed briefly in my paper, and in more detail in the much thicker volume by Havelock and his associates.

I have already apologized for not citing the work of more developers and diffusers. A foot note made clear that I was relying upon the Havelock volume for more complete credits to other authors. The critic is perfectly correct in assuming that my own experience is closer to development than to diffusion. He has also said the task should have been divided into two papers. Perhaps he has proved his point.

I do not agree that systems models work less well in education than in "training." The development model referred to so often as to irritate the critic has been applied by 165 graduate students in all teaching areas of education, often meeting the familiar 90/90 criterion of effectiveness.

Clearly the critic and I differ on our degree of dependence upon rational analysis vs. empirical facts. The facts quoted from the Markle report are significant in themselves, apart from the fact that education often has a more heterogeneous population of learners than do many industrial or military training courses.

So as to the development aspect of the proposed model, all I can say is: "It works." As to the diffusion component, time will tell.

Looking to the future, I expect that several successful models will appear. For a while, old and new models may be applied simultaneously. I do not say there is only one way to do it, and I did not say so in the paper.

I do expect that consortium agreements in the proposed model would be few and minimal (and very general) at first, followed by increasing detail of consensus with each iteration or cycling of effort. For example, the first agreement might be that instructional materials should be learner oriented, not teacher oriented. Modular construction might be agreed upon to enhance individualization of objectives and standards for different learners. Gradually more detailed goals or objectives would be agreed upon. I agree with the critic's estimate that this is the main function of some organizations in the consortium, while others take the lead in development, evaluation, teacher training, and other components.

But if it is difficult to achieve agreement among R&D specialists, I assume it will take a lot of effort to reach multiorganizational agreements, but that it is worth trying is my major thesis.

CHAPTER 4

A FRAMEWORK FOR THE ANALYSIS AND EMPIRICAL INVESTIGATION OF EDUCATIONAL RDD&E

AUTHORS: H. Del Schalock
Research Professor
Teaching Research

and

G. Roger Sell
Assistant Research Professor
Teaching Research

CRITIQUER: Glen Heathers
Professor of Education
Learning Research and Development Center
University of Pittsburgh

SYNOPSIS

The Schalock-Sell paper also focuses on the nature of educational RDD&E activities, but from a point of view that is considerably different from that reflected in the other papers in the volume. The intent of Schalock and Sell is to put forth a conceptual framework for viewing educational RDD&E that can be used to study those activities empirically. As a consequence, even though the paper covers the same ground as the other three, it does so in a way and at a level of detail that gives it a distinctively different flavor.

Schalock and Sell view RDD&E activities as "problem-solving tools" which have identifiable outputs. Accordingly, RDD&E are defined formally in terms of their outputs, their linkages are tracked in terms of outputs, work requirements are identified in terms of outputs, etc. Seven conceptual sets are provided in the paper, all of which have been developed for and applied to the description of ongoing educational RDD&E projects. The emphasis upon the output side of RDD&E is consistent with the point of view expressed by Gideonse, and seemingly consistent with the view of Briggs, though he doesn't speak of outputs as such.

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While the authors assume responsibility for the ideas presented in the pages which follow, and the way in which those ideas are expressed, the ideas themselves have emerged from the work of many. As with any conceptual effort there is an obvious debt to those who have contributed to the accumulated literature of the field. That debt will be evident in reading the paper. Debt is also owed to others, however. In the early stages of thinking about the paper Drs. Jerry Fletcher, Dale Hamreus, and John Williamson were major contributors to its shape and content. So, too, were the writers and critiquers that have contributed elsewhere to the volume, the various consultants to the Oregon Studies, and the advisory committee to the Studies within Teaching Research. As the conceptual effort progressed, however, its shape and content were more and more determined by the realities encountered in the study of ongoing RDD&E projects. During that phase of development, a two-way process occurred: that of adapting the conceptual framework to the realities of the field, and that of adapting the study of the field to the demands of the conceptual frame. In that process the staff responsible for the empirical study played an invaluable role. Mr. Clark Smith and Mr. Loring Carl, primary developers of the category sets used to code the various dimensions of the RDD&E activities observed in the field, and the quality control agents in the application of those codes, deserve special mention in that regard. We extend our deepest appreciation to all who have been involved.

H. Del Schalock
G. Roger Sell

A FRAMEWORK FOR THE ANALYSIS AND EMPIRICAL INVESTIGATION OF EDUCATIONAL RDD&E

H. Del Schalock and G. Roger Sell

Teaching Research Division
Oregon State System of Higher Education

Introduction

> "What's the use of their having names," the Gnat said, "if they won't answer to them?"
>
> "No use to them," said Alice; "but it's useful to the people that name them, I suppose. If not, why do things have names at all?"[1]

The purpose of the present paper is to present a set of understandable words that describe the nature of research, development, diffusion, and evaluation activities as they occur within the context of education.[2] Collectively the words are intended to represent an intact conceptual system or framework, and thus are presented as a carefully defined set of concepts and an equally carefully defined network of relationships between concepts. The intent of the framework is threefold: (a) to provide a way of looking at the processes of RDD&E so as to optimize their applicability to education; (b) to provide a structural basis for the empirical investigation of such processes as they are applied within the context of education; and (c) to provide a language for communicating about both (a) and (b).

Five propositions provide the basis for the paper and the conceptual framework that it outlines:

1. The processes of research, development, evaluation, and diffusion represent an interdependent set of problem solving tools.

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[1] John Kemeney prefaced the chapters of his book A Philosopher Looks at Science (Van Nostrand, 1959) with selected excerpts from Lewis Carroll's Alice in Wonderland. Various of the excerpts, such as the one above, fit the intent and circumstance of the present paper so well that they have been incorporated within it. Our thanks to Messrs. Carroll and Kemeney.

[2] The formal definitions of these and other critical terms are in the GLOSSARY that will be found at the end of the paper. The meanings generally associated with them are introduced in the context of their discussion. When these terms are used as a collective set within the paper they are often referred to as RDD&E.

2. These tools have proved useful in supporting change in a wide range of man's endeavors, for example science and industry, but they have not as yet proved to be particularly useful in support of change in education.

3. The tools of RDD&E hold considerable promise for the solution of problems within education, but before that promise can be realized they must be better understood, more fully developed, and better adapted to the particular requirements of education.

4. The development and/or adaptation of RDD&E to meet the requirements of education can be accomplished best through empirical investigation.

5. Prerequisite to empirical investigation is a conceptual structure that marks the boundaries of that which is to be investigated and identifies the elements within those boundaries that are to be subjected to investigation.

As a point of departure in the paper, and as a way of making the assumptions of its authors explicit at the outset, each of these propositions is discussed briefly.

1. RDD&E As An Interdependent Set of Problem Solving Tools

While RDD&E are not usually construed as tools, it seems plausible to think of them as such. According to Webster's New World Dictionary, College Edition (1968, p. 1535), a tool may be thought of as "a means" to an end; and, since RDD&E are thought of as processes (activities, strategies) that produce outcomes, they meet the requirements of the Webster definition. So construed they are processes designed to extend knowledge (the output of research), create technology (the output of development), generate information in support of decisions that bear upon the worth or effectiveness of a product, event, or condition (the output of evaluation), and lead to the adoption and/or utilization of the outputs of research, development, and evaluation by the various consumer groups that have need for them (the output of diffusion).

As producers of outputs RDD&E serve education in many ways. In some instances their outputs may serve in and of themselves as solutions to problems faced by educators. In others they may serve as partial solutions to such problems, or as contributors toward solutions. The ability to link the outputs of RDD&E to the solution of educational problems seems to be largely a matter of how broadly or narrowly an educational problem is conceived, or how broadly or narrowly RDD&E outputs are defined.

RDD&E are frequently seen as interdependent activities. The long standing dependency of development upon research, and its reverse--the stimulation of research by the demands of development--are well known; the utilization of the outputs of research, development, and evaluation are obviously dependent upon the success of diffusion activities; and, it is coming to be recognized (see, for example, Hemphill, 1969a and Schutz, 1970) that development, at least as it is now coming to be practiced within the context of education, is as dependent upon evaluation as it is upon research. It is also coming to be recognized that both evaluation and research depend heavily upon development. Given these apparent interdependencies, and the assumptions that the extension of knowledge, the creation of technology, etc. are in fact solutions to problems, the view of RDD&E as an interdependent set of problem solving tools seems reasonable.

2. The History of RDD&E in Education as Compared to Their History in Other Aspects of Man's Endeavor

One has only to point to the recent history of the aircraft and space industry, agriculture, medicine, and warfare, and trace the role of RDD&E within them, to gain some sense of the utility of these activities as problem solving tools in service of particular ends. A comparable history is difficult to trace in education. Educational development, evaluation, and diffusion, as recognized entities within a body of literature, have existed for little more than a decade (Chase, 1970). And educational research, while reflecting a much longer history and a much larger body of literature, has been unimpressive in the difference it has made in the quality of education. In the view of Shulman (1970):

> "...If the object of such research is the development of coherent and workable theories, researchers are nearly as far from that goal today as they are from controlling the weather. If the goal of educational research is significant improvement in the daily functioning of educational programs, I know of little evidence that researchers have made discernible strides in that direction" (p. 371).

If these views are accurate, then in comparison with their contributions in other areas of man's endeavor, the net contribution of RDD&E to the improvement of educational practice has been small indeed.

3. The Potential Contribution of RDD&E to the Improvement of Education

While the overall contribution of RDD&E to education thus far appears to be small, it is the view of the authors that these processes represent potentially powerful tools for solving a wide range of problems that face education, and that in time their potential in this regard will be realized. It is our belief, for example, that in time it will be possible to establish principles of instruction[3] that can be used reliably in designing effective learning plans for children and that in time, through the application of systematic development procedures, it will be possible to create instructional systems that will bring about particular learning outcomes for particular students with known degrees of reliability. It is also our belief that diffusion practices will be found that assure the optimal distribution, adoption and use of the outputs of research and development, and that evaluation procedures will be established that enable researchers, developers, diffusers, and practitioners to adapt that which they are attempting to do so as to make it optimally effective. The distance between hope and achievement, however, is great and it is our view that before such breakthroughs occur the general problem solving strategies of RDD&E will have to be translated into tools that are more effective within the context of education than they are at present.[4]

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[3] As used here a principle of instruction refers to a demonstrable relationship between sets or clusters of instructional strategies and the achievement of a particular learning outcome for a particular kind of learner in a particular kind of setting.

4. Adapting RDD&E to the Needs of Education Through Their Empirical Investigation

The proposition that the empirical investigation of RDD&E activities within the context of education provides the best possible means of bringing about their adaptation to the needs of education rests upon three related assumptions: (*a*) that to be effective the strategies of RDD&E have to be adapted to fit the particular demands of the particular context in which there is an application; (*b*) that by and large such adaptation has not as yet been made in education; and, (*c*) that the best way to adapt any process to fit the demands of any context is to systematically study that process as it is applied within that context. Thus it is assumed that RDD&E within the context of the automobile industry take a somewhat different form than they do within the context of agriculture, and that to be effective they will take still a different form within the context of education. Moreover, it is assumed that as variation appears within any one of these broad areas of application--for example, the variation that exists between the professional school of a university, a traditionally organized high school, and an open space elementary school that emphasizes individualized instruction--even further adaptations will need to occur.

Such a view rests upon an appreciation of the power of contexts or situations to shape that which occurs within them (Brunswick, 1956; Shulman, 1970) and assumes that to be effective within specific contexts the strategies, processes, and goals of RDD&E must be adapted accordingly.

Assuming the correctness of such a point of view, how can RDD&E best be adapted to fit the needs of education? The proposition advanced here is through turning the tools of RDD&E upon themselves. By systematically manipulating these activities within well defined educational contexts, and systematically determining their effectiveness within them, it should be possible within a relatively short period of time for RDD&E to become the kind of adaptive, alternative-providing force in education that it has become elsewhere.

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[4] It needs to be recognized that even when such translations have been made the resulting tools will not be robust enough to solve all of the problems faced by education. Projecting educational needs of the future, for example, or establishing sound educational policy or securing the financial underpinings of education are problems that are not likely to yield to the tools of educational RDD&E alone.

5. The Dependency of Empirical Investigation Upon a Conceptual Framework

Prerequisite to any empirical investigation is a set of concepts that marks the boundaries of that which is to be investigated and identifies the elements within those boundaries that are to be the focus of the investigation.[5] In their present stage of development educational RDD&E do not have conceptual structures that meet these criteria (support for this statement is provided in the next section of this paper) and, as a consequence, such structures have to be established before the empirical investigation that has been called for above can be undertaken. The primary aim of the present paper is to outline a first approximation to such a set of conceptual structures.

So much for rationale. The paper consists of three parts: a review of the literature pertaining to educational RDD&E, the presentation of the framework, and recommendations as to steps to be taken to increase the effectiveness of RDD&E as problem solving tools in education. The bulk of the paper is devoted to the description of the conceptual framework.

The approach taken to the development and presentation of the conceptual framework can best be described as at once analytic and provisional. It is analytic in that it starts with a set of generic definitions for RDD&E and on the basis of these definitions proceeds to lay out a conceptual frame that describes their nature and function within the context of education, the interactions that occur between them, and the elements that comprise them. It is provisional in that while the framework has had continuous empirical referencing in the course of its development,[6] it has not had the benefit of carefully designed studies to test its validity. As a consequence the framework is offered only as an approximation to that which will emerge ultimately. Such a stance is taken purposefully, however, for from the authors' view of science all things assume a provisional status. In Kaplan's (1964) terms:

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[5] As used in the present paper, concepts are logical constructions that:

> ". . . mark out the paths by which we may move more freely in logical space. They identify nodes or junctions in the network of relationships, termini at which we can halt while pre-serving the maximum range of choice as to where to go next . . . There is a chemistry, as it were, for all things, and their scientific conceptualizations aim at identifying the elements and compounds of this chemistry . . . The function of scientific concepts is to mark the categories which will tell us more about our subject matter than any other categorical set" (Kaplan, 1964, p. 52).

As such concepts represent the starting point in the extension of knowledge, and in many respects its ending point.

[6] See the third section of this paper (p. 212) for a review of the empirical testing that the proposed framework has received.

> "Every taxonomy is a provisional and explicit theory. . . As knowledge of a particular subject-matter grows, our conception of that subject-matter changes; as our concepts become more fitting, we learn more and more. Like all existential dilemmas in science, of which this is an instance, the paradox is dissolved by a process of approximation; the better our concepts, the better theory we can formulate with them, and in turn the better the concepts available for the next improved theory. . . It is only through such succession that the scientist can ultimately hope to achieve success" [pp. 53-54].

Notes on a Conceptual Muddle

> "It's really dreadful," she muttered to herself, "the way all the creatures argue. It's enough to drive one crazy."

In reading the literature that pertains to educational research, development, evaluation, and diffusion the overwhelming impression gained is one of conceptual disarray. The long standing distinction between basic and applied research is under attack (Reagan, 1967; Carroll, 1969; Kidd, 1959); the similarities and differences between research and evaluation are still not clear (Cronbach and Suppes, 1969; Hemphill, 1969b; Hayman, 1970; Schalock, 1970b); rival "models" of evaluation are competing for attention (Stake, 1967; Stufflebeam, 1968; Provus, 1969; Glass, 1971); the nature and purpose of educational development is still under definition (Hemphill, 1969a; Jones, 1969; Schutz, 1970; Walker, 1970); and, the concept of diffusion is still essentially without meaning. Sometimes it is cast within the context of knowledge or research utilization (Jung and Lippitt, 1966; Havelock and Benne, 1967); sometimes within the context of the dissemination of information (Farr, 1969); and sometimes within the context of innovation and change (Foshay, 1966; McClelland, 1968). There are also conflicting views as to the nature of the interdependencies that exist between these activities. At times they are described in linear relationships (Guba and Clark, 1965); at times in decision-oriented relationships (Gideonse, 1968); and, at times in "linkage" relationships (Mason and Boyan, 1968; Glaser, 1968).

The purpose of this section of the paper is to highlight some of the major conceptual problems that exist in the literature pertaining to RDD&E so that the reader may have a sense of the context within which the proposed framework rests.

The literature reviewed in the following pages focuses essentially upon problems of definition. In this sense it is a very limited review and one that may have limited utility, since definitions are arbitrary and continuously under modification. For purposes of the present paper, however, such a review is seen as an appropriate place to begin, for it is by definition that meanings are specified and concepts born. Concepts emerge only after meanings are assigned to terms and the process of concept clarification, simplification, and systematization can occur only after an initial set of concepts exist. Relying upon Kaplan (1964) once more:

> ". . .the process of specifying meaning is a part of the process of inquiry itself. In every context of inquiry we begin with terms that are undefined--not undefineables, but terms for which that context does not provide a specification. As we proceed,

empirical findings are taken up into our conceptual structure by way of new specifications of meaning, and former indications and references in turn become matters of empirical fact" (p. 77).

Thus, beginning with definitions is very much like beginning at the beginning. And, in a veiw of the literature on educational RDD&E, that seems like a good place to begin.

Research

Of the four basic concepts with which the paper deals, that of research seems to have the clearest meaning. By and large it is seen as a set of activities governed by a reasonably well specified set of procedures that lead to the extension of knowledge, with knowledge being defined broadly as conclusions that can be logically defended or empirically demonstrated. Beyond this general definition, however, there is little agreement to be found. There is still no clear agreement, for example, as to the relationship of research to the broader concept of "disciplined inquiry" (Cronbach and Suppes, 1969), or as indicated earlier, even to the long standing distinction between basic and applied research. When the criteria that have been used to make such distinctions are viewed closely, however, this is not surprising.[7] They imply that knowledge produced in an attempt to control or eradicate cancer, build an atomic bomb, reach the moon, or make it possible for every child to read (all instances of "applied" or "mission-oriented" research) is in some way fundamentally different from or is produced by fundamentally different means than knowledge produced in an attempt to understand the molecular structure of cells, the structure of the atom, the origin of the earth, or how children learn (all instances of "basic" research). While it may be true that the motives of persons working toward the solution of such problems differ, and that the variables manipulated and the methodologies employed differ, the bothersome question is whether the nature of the magnitude of such differences is so great that separate labels have to be created to distinguish between them.

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[7] See for example the definitions offered by Cohen (1948) and the National Science Foundation (1960), respectively.

"The difference between those who work at fundamental research and those who work at applied research is in the point of view with which they face the problem and the goals they have in mind. The man working at the 'pure science' end of the spectrum, whether in a university or in an industrial laboratory, pursues a problem because it is interesting or because it appears to have a certain relevance to fundamental knowledge. By contrast, the man working at the applied science end of the spectrum pursues a problem because it has relevance to a particular practical goal" (p. 303).

"Basic research is directed toward increase of knowledge; it is research where the primary aim of the investigator is a fuller understanding of the subject under study rather than a practical application thereof. Applied research is directed toward practical applications of knowledge. (Applied research projects) have specific commercial objectives with respect to either products or processes" (p. 5).

In some respects questions as to the nature of differences between kinds of research appear to be of a "how-many-angels-on-the-head-of-a-pin" variety. What does it matter that some research is directly applicable to needed solutions to problems while some is not, or that some people are interested in the extension of one kind of knowledge while others are interested in the extension of another? Isn't the extension of knowledge the extension of knowledge? And aren't the basic rules governing that activity roughly the same across substantive areas, or across problems within a particular area?

In other respects, however, it may be that differences really do exist in the conduct of different kinds of research, or that different temperaments really are needed by people to carry out different kinds of research, or that different strategies do have to be followed to secure funding for different kinds of research. If this should be the case, then questions as to the nature of the differences within that which can properly be labeled research may serve a useful function.

And that seems to be where the definitional problem resides. On the one hand, research is research; on the other, there is the gnawing sense that there are fundamental distinctions between kinds of research. The basic and applied distinction has been around for a long while, and funding agencies, state legislatures, and the Congress act in terms of it, even though they are not particularly comfortable with it. But efforts to bring other distinctions forward--for example, mission oriented or operations or action research--have not seemed to solve the problem.

In the proposed framework the general definition of research as a set of activities that leads to the extension of knowledge has been accepted. Within this general definition, however, attention is directed to the question of whether there are not other dimensions on which differences in research activities can be ordered that will give them greater functional utility within the context of education than the basic-applied distinction.

Evaluation

While the term evaluation is as familiar to persons in education as is the term research, it by no means has as much agreement as to definition. The first and perhaps the most basic source of disagreement is whether evaluation is to be thought of as an "information" generating activity or a "knowledge" generating activity. The models of evaluation proposed by Stake (1967), Stufflebeam (1968; 1969), and Provus (1969) assume that the purpose of evaluation is to collect information that is to serve on-line decision-making, without regard to the generalizability of that information. The models proposed by Suchman (1967) and Cronbach and Suppes (1969), however, argue that procedures should be employed in the collection of such information so as to make it generalizable.

In the view of the authors, it is this difference of opinion that leads to much of the confusion that exists in the literature on evaluation (Cronbach and Suppes, 1969; Hemphill, 1969b; Hayman, 1970;

Schalock, 1970b), and to much of the language that reflects such confusion. The recent article by Caro (1971) illustrates the problem (italics have been added):

> "Efforts in the past decade to reduce the incidents of major social problems have stimulated a new interest in *program evaluation*. Numerous writings have appeared on the use of the concepts and methods of *behavioral research* in *evaluating* these interventions. This paper is a review of that literature. . . The first part of the paper is concerned with the basic issues which include definitions, approaches to *evaluation methodology*, roles of *evaluation* in *program development*, and distinctions among various forms of *research*. The second section deals with organizational matters such as the establishment of the *evaluative research role*, administration of *evaluation research*, utilization of the results of *evaluation*, and implication of client activism for evaluation. . ."(p. 87).

Sentences appearing later in this article, such as, "Some of the non-use of *evaluation results* is attributable to *limitations of the research itself*" (p. 95), do not help the matter.

While it is not possible to tell whether the apparently confused but surely confusing language in the Caro article is a matter of fuzzy concepts or an imprecise use of terms, the effect on the reader is the same.

Attendant to the issue of whether evaluation is a knowledge generating activity or an information generating activity in service of on-line decision-making is the issue of similarities and differences in methodology. Suchman (1967) argues that the distinction between basic research and what he calls evaluative research is one of purpose rather than of method. Hemphill (1969b) holds a similar view. Guba and Stufflebeam (1968) argue, however, that this is not so, claiming that the application of comparative experimental designs to evaluation problems makes unwieldy the collection of data, and thus reduces the possibility of the evaluation function to effectively support on-line decision-making. The entry of others into the debate (Glass, 1971; Stanley, 1969; Hayman, 1970; Schalock, 1970b) mark the issue as one which will not be easily or quickly put to rest.

A host of other distinctions and issues contribute to the definitional problems surrounding the concept. As in the case of research, evaluation has its own version of the dichotomy dilemma in its distinction between formative and summative evaluation (Scriven, 1967).[8] It also has competing "models" of evaluation, for example, those proposed by Stake (1967), Suchman (1967), Stufflebeam (1968), and Provus (1969), each of which seems to derive from somewhat different views of the nature of evaluation. There are also distinctions which emerge as a consequence of the "focus" of a particular evaluation. Levien (1970) identifies four distinctively different foci for evaluation activities--policy evaluation, program evaluation, outcome evaluation, and assessment evaluation--each of which apparently requires somewhat different methodologies and each of which overlaps or crosscuts all of the other distinctions made above.

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[8] As used by Scriven formative evaluation is designed to improve a product or program while it is still fluid; summative evaluation is designed to appraise a product or program after it is well established.

Finally, there is disagreement as to whether the act of valuing or judgment-making in the process of evaluation should be done by the "evaluators" or left to the "decision-makers." The preference of Scriven (1967) and Glass (1971) is for the evaluators to do the evaluating. The models proposed by Stake, Stufflebeam, and Provus prefer that the valuing activity be carried out by those who are to use the information generated by the evaluators.

Given such wide ranging differences in point of view as to the nature, function, and focus of evaluation it is hard to know where to begin with definitions. On the assumption, however, that as yet evaluation has no clear cut identity apart from research the major concern within the proposed conceptual framework is in making that distinction. Attention is also directed to the relationship of evaluation to development and diffusion, and to the matter of differing kinds of evaluation; but, the framework does not carry the latter set of distinctions far.

Development

Richard Schutz, a leading practitioner of that which is called educational development, has recently written that:

> "Writing on the nature of educational development at the present time is as speculative as writing on the nature of the industrial development would have been in the 17th century. The scope of the phenomenon, 'educational development,' has yet to be realized" [1970, p. 39].

While Schutz's comment is probably as true for the methodology of educational development as it is for its scope, there is a body of literature which suggests that there is at least a beginning awareness of what the field of educational development might be and the form which its methodology might take. In reading its literature, however, one gets the impression that the field is not as far in its evolution as that of evaluation and, as a consequence, the conceptual base within it is even more fragmentary.

In general terms educational development is seen as "a systematic process of creating new alternatives that contribute to the improvement of educational practice" (Hemphill, 1969a, p. 23). This definition is consistent with the views of Hamreus (1969), Jones (1969), Randall (1970), and Schutz (1970). It is also consistent with the definition of development provided by the National Science Foundation: "The systematic use of scientific knowledge directed toward the production of useful materials, devices, systems of methods. . ." (1969, P. 2). The emphasis upon systems design principles of nearly all current writing on the subject has led to the methodology of educational development being described variously as knowledge-based, systematic, rigorous, empirical, data dependent.

It is this dependency upon the use of data to determine the effectiveness of that which is being developed which sets systematic educational development apart from the developmental efforts of teachers in the schools, publishers, national curriculum groups, and the like. As Jones (1969) has put it:

> "It is at once apparent that numerous groups such as publishers, national curriculum groups, and professional curriculum groups have endeavored to develop more appropriate rationale and materials for learning. Yet, absent from most of these endeavors is one essential developmental ingredient--testing the products to determine if they actually achieve the objective for which they were developed" (p. 1).

Beyond these broad lines of agreement about the nature and function of educational development, there is little that seems to match in any precise way. The focus of development varies from hardware to software, from product to process, from materials that support the learning of children to materials that support the learning of teachers of children. The specific steps to be followed in the various models of development seem to vary with each group that is involved in the developmental process (Briggs, 1972). And the language within which the data-dependent mode of operation is couched shares little agreement.

As in the case of evaluation, the primary concern with the concept of development in the proposed conceptual framework is its distinction from the concept of research. Attention is also directed to the interdependencies of development, evaluation, and diffusion and to differences in kinds of development. But as in the case of evaluation the framework does not carry the distinctions far.

Diffusion

Of the four basic concepts with which this paper deals, the concept of diffusion is the least clear in its meaning in the literature. As indicated previously, sometimes the concept is couched in terms of dissemination, sometimes in terms of planning for innovation, and sometimes in terms of knowledge or research utilization. In some cases writers have proposed diffusion as the process that is designed to get the outputs of research, development, and evaluation into the hands of users, by whatever means (Havelock and Benne, 1967), while others prefer to identify discrete steps within that overall process and to refer only to some of those steps as inclusive of the domain of diffusion. Guba and Clark (1965), for example, divide the activities that lead to the utilization of research, development, and evaluation outputs into two major headings--diffusion and adoption. Under diffusion they include the processes of dissemination and demonstration, and under adoption they include the processes of trial, installation, and institutionalization.

Other writers hold differing views. For example, Hemphill's (1969a, p. 24) notion that the product development process tends to equate dissemination with the functions of manufacturing and marketing, and Briggs (1972, p. 149) notion that developed products serve as the change-creating mechanisms.

Given such a state of affairs, the conclusion reached by Havelock and Benne (1967) after an extensive review of the literature in the area of research of knowledge utilization is not surprising:

> "While the utilization of knowledge is a hope for some and even a firm expectation for others, it remains, for most of us, a poorly defined and poorly articulated concept. On the one hand we are aware of an enormous and ever-increasing body of specialized scientific knowledge and, on the other hand, we have a vague vision of this knowledge being used to make better washing machines, safer automobiles, better schools, and happier community relations. Yet there is no clear picture of how we get from one end of the utilization chain to the other" (p. 49).

Nor is it surprising that Hood (1972) reaches a similar conclusion with respect to the diffusion of hard products.

In the authors' judgment major sources of confusion in the literature on diffusion rests with the failure of writers to distinguish clearly between kinds of research, development, and evaluation outputs to be diffused, for seemingly the nature of that which is to be diffused influences significantly the processes by which diffusion occurs. When that which is to be diffused is the output of research or evaluation activities, i.e., knowledge or information, it seems appropriate to talk of "dissemination" as the appropriate vehicle to support diffusion efforts. In this case dissemination refers essentially to the distribution of information to potential consumer groups.

If that which is to be diffused is an output of development, however, such as a new curriculum, a new assessment device, or a new scheme for scheduling students into classes, the process of diffusion apparently requires steps beyond a simple distribution of information.[9] In diffusing outputs such as these there must still be the dissemination of information about them, but apparently there must also be (a) an opportunity to see the product in operation (a demonstration), (b) an opportunity to try it out, (c) an opportunity to weigh information relative to cost and resource requirements for its implementation and long-term operation, (d) support services to help in its initial installation and operation, and (e) the provision of support services for long-term maintenance and operation. It is also probable that diffusion strategies need to vary according to the specific features of a product under consideration. For example, the larger the change that the adoption of a given product will make upon an operating setting, the greater the care that is likely to be needed in relation to all of the considerations just outlined.

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[9] Guba (1967), in keeping with distinctions made earlier, (Guba and Clark, 1965), insists that diffusion and adoption be treated as separate entities. For purposes of the present paper, adoption is treated as one of the terminal steps in the diffusion process.

In the conceptual framework proposed in the present paper attention is directed to the nature of the diffusion process, and the relationship of that process to research, development, and evaluation. Some attention is also directed to differences in strategies of diffusion, depending upon that which is to be diffused. As indicated previously, the rationale for treating diffusion within the same framework that research, development, and evaluation are treated is that diffusion is the means by which the outputs of research, development, and evaluation are to find their way into practice. Another reason for doing so, however, is the author's belief that Hood's analysis is correct: "Educational diffusion may become the Achilles' heel of the entire research, development, and evaluation enterprise" (1972. p. 130).

And Various Combinations Thereof

In the introduction to the paper the processes of RDD&E were referred to as an interdependent set of problem solving activities or tools. Within that context the obvious linkage of diffusion to RD&E and the much discussed relationship between research and development were mentioned. Also mentioned was the growing awareness of the dependency of development and diffusion upon evaluation, and the dependency of evaluation and diffusion upon development. The point of that discussion was to establish the validity of viewing RDD&E as an interdependent set of problem solving activities. The purpose of the present discussion is to provide a brief review of the various ways in which these interdependencies have been viewed by persons writing in the field.

Gideonse (1968; 1969; 1970; 1972), probably more than any other writer, has worried about the nature of the interdependencies between RDD&E and the way that they are conceptualized. In the report of a major review of educational research and development in the U.S. (1969), he identifies three "models" that describe these interdependencies. One of these he labels as a linear or dependency model which ". . .tends to view the goal of educational improvement as being dependent upon adequate diffusion mechanisms, which in turn require the invention and development of tested innovations to diffuse, which in turn depend upon the adequacy of the research base" (p. 5). Guba and Clark (1965) are cited as persons who support a linear model of RDD&E.[10]

The second and third "models" of RDD&E in education identified by Gideonse (1969) are the decision-oriented and linkage models. He sees the decision-oriented model as holding

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[10] It should be noted, however, that in their 1965 paper, and subsequent (Clark, 1972), these authors have insisted that the linear model that they have proposed is only an idealization or abstraction. They do not assume that RDD&E necessarily operates in such a manner.

> ". . .essential differences and disconnections between the research, development, and dissemination functions. Models such as these draw attention to the different rules of evidence and sources and types of data input to decision making in each function. The relationships among different types of activities within research and development are recognized, but these models tend to be more impressed by the present day decision-making requirements than by patterns which may emerge from somewhat longer-term historical analysis of change or from the apparent logical dependence of one function on another" (p. 5).

and the linkage model as stressing

> "The close interrelatiions of research, development, and dissemination. The linkages are elevated to closer scrutiny without necessarily limiting attention to the particular stages in inquiry, development, and dissemination. Models in this category may have a tendency to be performer-oriented and to stress the importance of individuals in a research-development-dissemination continuum" (p. 6).

The work of the House of Representatives Committee on Government Operations (1966) and Sherwin and Isenson (1967) are cited as examples based upon or implying the decision-oriented model. The publications of Mason and Boyan (1968), Glaser (1968), and Raisbeck (1965) are cited as representives of a linkage model.

In the authors' view there is validity in all three of the models identified by Gideonse. However, the framework proposed in the present paper reflects more closely the characteristics of the decision-oriented and linkage models than it does the linear model. This stems largely from the view that there is little that is predictable in the patterning of RDD&E when they are viewed as an interdependent set of problem solving activities. In our observations, the nature of the problem being pursued, the preferences of the persons involved, and the resources available to them seem to be much more powerful determiners of the sequence or pattern of activities which characterize a given problem solution than is a pattern which people assume to be implicit in such activities.

The focus of the preceding has been a review of the state of concepts in the field of educational RDD&E. The framework which follows is intended as a constructive response to it.

A First Approximation to an Empirically Based Framework for Viewing Educational RDD&E

> "If any of them can explain it," said Alice, "I'll give him sixpence. I don't believe there is an atom of meaning in it."
>
> "If there is no meaning in it," said the King, "that saves a world of trouble, you know, as we needn't try to find any."

The framework that is outlined in the pages which follow represents an effort to provide a standard set of meanings for the concepts of educational RDD&E and their interactions. The framework consists of formal definitions, relational terms, and a taxonomic structure that provides a language for describing both the vehicles or mechanisms that carry RDD&E activities (projects, programs, institutions) and the structure, function, and operation of those mechanisms. Specifically, the framework consists of seven interrelated category sets: one which provides basic definitions for educational RDD&E; one which provides for the description of the interactions between RDD&E activities as they occur within the context of education; one which provides for the description of vehicles which carry educational RDD&E; and, four which describe the organization and operation of such vehicles. In combination these seven category sets are intended to identify all of the major dimensions of, elements within, and interactions between RDD&E activities as they occur within the context of education.

Assuming that such exhaustiveness has been realized and that other critical properties of category sets have been obtained--for example, meaningfulness, power, and discreteness--the framework as a whole should provide the conceptual tools needed to describe or map the domain of educational RDD&E, or any given R,D,D, or E activity that takes place within it.[11] It also provides a language that permits reliable communication about that which is mapped and a way of thinking about RDD&E generally that should facilitate their more effective application within the context of education.[12]

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[11] It is probable that the category sets that comprise the framework are applicable to the description of RDD&E activities in fields other than education, but as yet they have not been tested in that regard.

[12] The reader needs to be clear that the intent of the present paper is to present only the conceptual tools for mapping the domain of educational RDD&E, not an actual map of that domain. Volume I in the series of volumes reporting the Oregon Studies contains such a map. Volume V in that series contains the operational definitions, decision rules, etc. that permit the conceptual tools described in the present paper to be applied in the mapping process. The volumes that comprise the series as a whole are described on the inside of the back cover.

Finally, the framework as a whole provides a basis for a science or technology or discipline of educational RDD&E, in that it is addressed to: (a) an inventory of the entities, phenomena, and relations in the field of inquiry, (b) naming and describing those entities, phenomena, and relations, and (c) classifying them in orderly systems (Dussault, 1970, p. 12). According to Northrop (1947) and Nagel (1961) these are the conditions necessary for any scientific undertaking, for they are prerequisite to either the formulation of comprehensive theoretical systems or the empirical investigation of the elements that comprise such systems. In the language of Kaplan (1964) they also represent the beginning of a theory in that they provide ". . .a way of making sense of a disturbing situation so as to allow us more effectively to bring to bear our repertoire of habits, and even more important, to modify habits or discard them altogether, replacing them by new ones as the situation demands" (p. 295).

The stimulus to the development of the framework was the project from which the present volume emerged (Schalock, 1970c). As initially conceived the Oregon project was designed as an "applied" research study that would directly support the efforts of the Research Training Branch of the National Center for Educational Research and Development, U.S. Office of Education, to design and develop new training programs for the preparation of educational RDD&E personnel. As the study was implemented, however, it assumed the properties of a basic research project in that its primary charge became one of providing (a) an initial mapping of the domain of educational RDD&E, (b) a methodology that would enable such mapping to occur, and (c) a conceptual framework that would give meaning to that which was mapped.

Specifically, the charge of the project became one of developing a methodology which would permit the detailed description of ongoing research, development, diffusion, and evaluation projects and/or programs in education,[13] and to apply that methodology to an illustrative set of approximately 20 such projects that cross-cut the range of ongoing educational RDD&E activities in the nation. The decision to select projects that ranged widely across the domain of educational RDD&E rested upon the need to identify the parameters of such activities, and to insure that the methodology that was being developed would in fact be sufficiently generalizable so as to be applicable to the description of the full range of activities found within that domain.[14]

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[13] Hereafter referred to only as projects.

[14] A special tribute needs to be paid to the far-sightedness and courage of the advisory committee to the project in this regard, for they had the wisdom to encourage the evolution of the methodology throughout the life of the project. By so doing they placed greater faith in the long-term good that would result from a strong methodology than in the short-term good that would derive from the availability of data from a weak methodology. This meant, in effect, that the data from the 20 case studies would not be fully comparable. The trade-off was a more useful methodology for a more limited initial mapping of the field, a trade-off in the writers' judgment that was in favor of the long-term good of education.

The framework that is outlined in the pages which follow, then, is the result of a year's effort at conceptualizing the nature of educational RDD&E and testing that conceptualization against operating projects. The testing engaged in, however, was only developmental or "formative" in nature, that is, versions of the framework were fashioned and then tested to see whether they described adequately that which occurred in the field, refashioned on the basis of that evidence, and recycled. In the course of the year, six major revision cycles took place. The framework has not as yet received formal empirical testing, and thus it is almost certain that it will need further revision as it is honed against formal hypotheses or as it is applied to ongoing projects that vary in some significant way from those on which it has been tested thus far.

Conceptual Set 1. Definitions

In the development of a framework that is intended to invite and support empirical investigation, care must be taken to insure that basic definitions not only clarify but permit reasonable operational definitions to follow. As a means to this end, research, development, diffusion, and evaluation have been defined throughout the framework in terms of the outputs that they are intended to produce. OUTPUTS refer to identifiable and significant planned outcomes of targeted work activities, with targeted work activities being actions directed toward the realization of projected goal states.

Such an approach to the problem of definition is intended not only to sharpen the distinctions between RDD&E activities, but also to highlight the manner in which such activities--either individually or collectively--can contribute to the improvement of education. By fixing attention to the output side of RDD&E efforts the users of such tools should be able to be clearer about what problems they can hope to solve with them and what they can expect from their application. It is also assumed that by gaining greater clarity as to the outputs to be expected from the application of RDD&E in education, those who perform RDD&E services to education will be held increasingly accountable for producing those outputs.

In the present paper first level or "generic" definitions of research, development, diffusion, and evaluation are offered. The concept of second level or "subclass" definitions is introduced and illustrated, but since the project from which the framework emerged did not require a second level analysis of RDD&E a corresponding conceptual frame has not been developed or tested. The direction of energy toward this end, however, is an undertaking that should assume priority in the years ahead.

First Level Definitions

Educational RDD&E. A coordinated set of problem solving strategies designed to produce recognizable outputs that can be judged as to their quality and their contribution to the solution of educational problems. So defined, educational RDD&E has two major characteristics: (a) it tends to focus upon the reduction of discrepancies--theoretical, methodological, or operational in nature--between present and goal conditions in education; and, (b) it has as its consequences outputs that can be judged as to the adequacy with which they reduce the problem to which they have been directed, that is, the adequacy with which they reduce the discrepancy between present and goal conditions. The outputs expected to derive from educational RDD&E are specified in the definitions which follow

Research. A problem solving strategy designed to produce reliable knowledge, that is, facts, principles, generalizations, theories, and laws that are generalizable and that can stand the test of empirical verification.[15] So defined, educational research is characterized by procedures of problem stating, design, measurement, and analysis that when applied produce outputs which have known degrees of generalizability, and that can be replicated for purposes of verification. Criteria for determining the quality of an output that derives from a research effort involve a combination of judgments as to the extent to which the output reduces the discrepancy between present and goal states, and the extent to which confidence can be placed in it as a consequence of the steps taken in its derivation. Examples of outputs that derive from educational research include: evidence as to the effectiveness of alternative instructional conditions in bringing about classes of outcomes for given sets of learners; the effect on teacher and student morale of a transition on the part of a school to team teaching; the effect of institutionalizing individualized or personalized instructional programs in an elementary school on teacher-teacher, teacher-administrator, teacher-parent, and teacher-pupil interaction.

Evaluation. A problem solving strategy that produces trustworthy information to be used in situation-specific decision making, that is, observations, reports, and other outputs of formal or informal measures that are collected with attention to the control of unwanted variance and organized so as to optimize their utility for a particular set of decision makers who have a particular decision or set of decisions to make within a given time frame.[16] So defined, educational evaluation is characterized by a set of procedures which generate information--through formal or informal measures--that is collected with as much attention to the control of unwanted variance as the constraints of time and resources will allow and that is organized for optimal use in decision-making. Judgments as to the quality of the outputs that derive from an evaluation effort center around the utility of such outputs, that is, their appropriateness to the decision to be made, their trustworthiness, and their timeliness. They do not have to meet the criteria of reproducibility or empirical verification that accompany the outputs of research, and they do not assume the property of generalizability.[17] Examples of outputs that derive from educational evaluation include: means, standard deviations, and individual pupil profile gain scores in selected subject areas in the 5th grade of school A; coded interview data from teachers and pupils as to the feelings that they have about the adoption of an IPI mathematics program in grades 1 through 3 in school B; teacher ratings of the extent to which a principal or a group of principals seek and incorporate their opinions in policy decisions affecting the operation of a school; nonobtrusive measures of the efficiency of the purchasing office of a school district, such as number of requisitions processed per day or the average length of time elapsed between submission of a requisition to the business office, its processing, and item delivery to a school.

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[15] This is a relatively narrow definition of research if the inquiry related activities of the mathematician, historian, and philosopher are also to be considered. For a discussion of disciplined inquiry broadly conceived see Cronbach and Suppes, 1969.

[16] This definition avoids the issue of where the "valuing" of the information is to occur, at the point of the decision or at the point of preparing the information for the decision-maker. It does make clear, however, the distinction between research and evaluation. Research has an output (knowledge) that is generalizable; evaluation has an output (information) that looks very much like the output of research, but differs in that it is collected for purposes of situation-specific decision-making. As a consequence, most information generated through evaluation activities is not generalizable. It is not, however, the result of "sloppy" research.

Development. *A problem solving strategy designed to produce reliable technology, that is, procedures, materials, hardware, and organizational frameworks that have a known degree of success in bringing about a particular outcome or in performing a defined operation.*[18] So defined, educational development is characterized by a set of procedures which systematically take outputs that are to be developed from their initial conception and design through a series of fabrications and operational field trials until there is empirical evidence that the output does that which it is supposed to do. Judgments as to the quality of the output are dependent upon evidence presented in support of its effectiveness in realizing the outcome expected from it, the results obtained by others who have used it, and the adequacy of the procedures used in obtaining the evidence that is reported for it. Examples of outputs that derive from educational development include the IPI mathematics program, the instructional programs emerging from Project PLAN, and the Westinghouse Learning Corporation's computerized program for the processing of test data.

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[17] This is not to imply, however, that the outputs of educational evaluation are without value to persons beyond the specific decision-making situation for which they are collected. They have value just as case history information has value to the practicing clinician, or as the experiences of a practicing researcher have value to the student of research. They do not have the same kind of value, however, that comes from the power of data that generalizes within parameters, across situations.

[18] Note the similarity between this definition of technology and that printed in a recent report of the Brookings Institute (Nelson, *et al.*, 1967): "Technological knowledge is a set of techniques, each defined as a set of actions and decision rules guiding their sequential application, that man has learned will generally lead to a predictable (and sometimes desirable) outcome under certain specified circumstances.

Diffusion. A problem solving strategy designed to bring about the adoption and/or utilization of generalizable knowledge, reliable technology, or trustworthy information. So defined, educational diffusion is characterized by a set of procedures which provide information about and create the necessary conditions for the adoption and/or utilization by appropriate consumer groups of outputs that derive from educational research, development, and evaluation. Dissemination of information about a given output can be done through oral, written, pictorial, or electronic means, or any combination thereof. Activities leading to adoption can involve illustration, demonstration, adaptation to fit the requirements of an adopting context, installation on a trial base, or any combination thereof. Criteria for judging the quality of an output that derives from a diffusion effort, that is, criteria for judging the extent or success of adoption and/or utilization, involve a combination of judgments as to the extent to which target populations have made adoptions and the success of operation once that which has been adopted has been installed.

Second Level Definitions

Providing definitions of educational research, development, evaluation, and diffusion that make it possible to identify and label such activities, and differentiate outputs among them, is a necessary place to begin in mapping the domain of educational RDD&E. If left at that level of generality, however, the map that would be produced would have limited utility. When attempting serious study of activities as complex as those being dealt with, when attempting to carry out such activities, or when attempting to prepare others to carry out such activities, the limitations of generic definitions become readily apparent. Finer discriminations, if at all possible, should be made. In the paragraphs that follow some tentative notions are advanced as to the form which such discriminations might take.

Historically, with the exception of the long-standing distinction between basic and applied research, and the rather recent distinction between formative and summative evaluation, there have not been distinctions made between classes of activity within research or development or evaluation or diffusion. The position taken here is that such distinctions should be made and that the organization and operation of educational RDD&E activities should be studied as to their variation across within-class distinctions. While unlikely, it is possible that one would find as much variation in the operations required to implement different classes of research or development or evaluation or diffusion activities as one would find in implementing research as contrasted to development, evaluation, etc.

In order to undertake comparative studies of this nature, at least binary classifications within RDD&E are needed. The long-standing dichotomy of basic and applied research, and the more recent distinction of formative and summative evaluation of course constitute binary distinctions; but, what is being suggested here is the need for a redefinition of the binary sets. (The second section of the paper, "Notes on a Conceptual Muddle," presented the rationale for this position.) The definitions appearing in Table 1 represent an illustration of such a set for research. Definitions provided later (Tables 3, 4, and 5) provide possible sets for evaluation, development, and diffusion, respectively.[19]

TABLE 1

Illustrative Second Order Definitions
for Educational Research

Construct Ascendant Research	Treatment Ascendant Research
Research which focuses upon the identification or clarification of constructs, their parameters, or their interrelationships	Research which focuses upon the identification or clarification of treatment conditions, their parameters, or their effects upon targeted outcomes
Examples: Projects which attempt to identify the dimensions of "creativity;" the nature of "observer influence;" the distribution of "intelligence" within a given population.	Examples: Projects which attempt to identify the influence of early separation experiences on interpersonal trust, or the effectiveness of alternative instructional strategies for a given class of children in relation to given class outcomes.

Four observations about Table 1. First, the notions of construct ascendant and treatment ascendant research represent a substantially different way of looking at classes of activity within research than does the traditional basic-applied distinction. Also, they are in keeping with the general strategy of defining RDD&E in terms of their outputs. In the case of construct ascendant research, the output is the clarification or identification of the parameters of conceptual constructs with which one is working, or the interrelationships between them. In the case of the treatment ascendant research the output is identification or clarification of the effects of certain treatment conditions on certain anticipated or observed outcomes. (These seem to represent functionally significant distinctions in that concept or construct clarification represents a markedly different kind of output than the effects of treatment conditions.)

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[19] The reader needs to be aware that the second level definitions offered in Tables 1, 3, 4, and 5 are intended only as illustrative, and that they have not had careful conceptual referencing nor empirical testing. They reflect serious thinking about the matter, however, and in that sense may offer reasonably good leads for subsequent development. The primary reason for including them in the present paper is to demonstrate that the field has in fact evolved vocabulary to describe subsets of RDD&E activities, and that these can be ordered in some reasonable way.

The second observation relative to Table 1 has to do with the utilization of such a distinction. Given the nature of the outputs expected from these two kinds of research activity, and assuming that the nature of that which is to be produced determines in large part what one has to do to produce it, it is probable that the two activities require somewhat different strategies or somewhat different emphases in their implementation. In relation to design, for example, the central issue in construct ascendant studies would be one of assuring parameter testing. In treatment ascendant studies the issue would be one of assuring clearly differentiated treatment conditions, control of all unwanted sources of variance, and selection of appropriate dependent variables. Such differences necessarily have implications for the design and operation of research studies, as well as for the training of persons to carry them out.[20]

The third observation in relation to Table 1 is that it is possible, and probably desirable in the long-run, to extend the distinctions within research, development, diffusion, and evaluation to at least another level of differentiation. Table 2 suggests what such a distinction might look like in the case of research.[21] It would seem unwise, however, to invest much energy in attempting differentiation at this level until first and second level distinctions have been firmly established.

Finally, by drawing attention to possible differences within research by distinguishing between classes of outputs rather than activities labeled "basic" and "applied," it is hoped that progress can be made in eliminating the sense of second class citizenry that has so often accompanied a focus on the "applied." Since design and measurement requirements are just as rigorous for the drawing of generalizations around treatment conditions as they are around construct specifications,

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[20] Obviously, construct ascendant research also has to deal with sources of variation, experimental treatments, etc., and treatment ascendant research has to deal with the problem of construct parameter; but, the centrality or "ascendance" of these matters varies considerably in the two cases. It is this matter of centrality or ascendance, and the assumption of variation of operations that accompany it, that is highlighted by the proposed distinction.

[21] The rationale for distinguishing between classes of research on the basis of the measurement properties of the variables under investigation rests on the observed variation in data collection, analysis, and interpretation strategies that link to these differences.

TABLE 2

Illustrative Third Order Definitions
for Educational Research

Construct Ascendant Research		Treatment Ascendant Research	
Variables limited to nominal or ordinal measurement	Variables permitting interval or ratio measurement	Variables limited to nominal or ordinal measurements	Variables permitting interval or ratio measurements

and theory development is equally critical to both, some of the devicive-ness that seems to follow the basic-applied distinction may be eliminated.

Tables 3, 4, and 5 contain illustrative sets of categories that might ultimately refine into level 2 definitions for development, evaluation, and diffusion. In all cases the definitions appearing in these tables are intended to reflect the same level of discrimination as made in Tables 1 and 2.

While it would be naive to assume that name changing in and of itself creates change in the way a construct is viewed, especially if it has assumed a special set of characteristics over a long period of time, it would be equally naive to assume that recasting a concept is without potential influence in this regard. If the recastings suggested in Tables 1 through 5 provide a reasonably sensible differentiation of differences within educational RDD&E, then it is possible that a major source of the variation in the operations needed to carry out such activities could be accounted for by classifying projects accordingly. Such at least must be the aim of the classificatory framework if it is to have functional utility.

Conceptual Set 2. Interactions

Many problems that face education appear to be solvable through applying the strategies of research or development or evaluation or diffusion alone. Identifying factors that lead to reading disability, for example, or determining the effect of school lunch programs on pupil energy level, are problems that appear to be appropriate for solution through research. Problems such as the creation of curricular materials, assessment procedures and information management systems to support individualized instruction, or the creation of budgeting-costing systems that will serve effectively a school district's efforts to manage by objectives, are problems that appear to be appropriate for solution through development. Problems such as getting all schools within a district to adopt a framework for

TABLE 3

Illustrative Second and Third Order
Definitions for Educational Evaluation

Process Evaluation		Product Evaluation	
Evaluative efforts which focus upon the means by which a thing is done		Evaluative efforts which focus upon the consequences of that which is done	
Examples: Projects which attempt to assess the adequacy of teaching skills, or the appropriateness of children's problem solving strategies		Examples: Projects which are to determine the results of student learning in a newly devised curriculum, or the worth of the results of a research study	
Within the context of a "formative" effort	Within the context of a "summative" effort	Within the context of a "formative" effort	Within the context of a "summative" effort

establishing goals and objectives so as to assure their statement at approximately the same level of generality, or getting all institutions within a state that prepare student teachers to adopt a new basis for certification appear to be problems appropriate for solution through the strategies of diffusion. And problems such as determining the impact of a new curriculum upon the students, staff and parents of an experimental school, or in determining community response to recent school board action, appear to be problems appropriate for solution through the strategies of evaluation. Individually and collectively, the solution of such problems contributes to the betterment of education; in the long run, however, education requires the solution of larger problems.

An assumption underlying the proposed framework is that as problems become larger and more complex their solution requires the application of the strategies of RDD&E in combination rather than individually.

In attacking problems of major scope in education, for example, creating the means for compensating early disadvantage in intellectual development, assuring that all children are able to read at a given level by a given age, or eliminating the basis for inschool dropouts, there seems to be little choice but to mount a coordinated effort that involves research, development, diffusion, and evaluation. The Right to Read Program launched by the U.S. Office of Education, the proposed Performance-Based Teacher Education Program, and the Sesame Street television series are cases in point.

TABLE 4

Illustrative Second and Third Order Definitions for Educational Development

Representational Development		Operational Development	
Developmental efforts which focus upon the production of abstract or symbolic outputs. Examples: Projects which have as their end product a model, a set of hypotheses, a classification scheme, or a curriculum outline.		Developmental efforts which focus upon the production of concrete or manipulative outputs Examples: Projects which have as their end product a measurement system, an instructional program, an information management system, or a data processing machine.	
Products that are relatively small in scope, i.e., "module" development	Products that are relatively large in scope, i.e., "system" development	Products that are relatively small in scope, i.e., "module" development	Products that are relatively large in scope, i.e., "system" development

TABLE 5

Illustrative Second and Third Order Definitions for Educational Diffusion

Interpretative Diffusion		Adoptive Diffusion	
Diffusion efforts which focus upon the utilization of knowledge and/or information Examples: Projects which attempt to get teachers to include career guidance information within the context of their courses, or utilize principles of reinforcement in the management of their classrooms		Diffusion efforts which focus upon the utilization of technology Examples: Projects which attempt to get schools to adopt the IPI Mathematics curriculum, or a Program-Planning-Budgeting-System in support of education management	
Dissemination	Incorporation	Dissemination	Incorporation

It also seems that even in attacking smaller problems all or some subset of RDD&E must be brought into play. Consider, for example, a school district that wishes to implement a reading program which (a) provides pupils a choice of specific learning objectives, (b) provides for the continuous collection of information on individual children as to their performance levels, interests, and history of success with given kinds of learning experiences, and (c) provides the opportunity for pupils to move through the program at their own rate and in a preferred sequence. Suppose that upon review of available reading programs none were found that met these criteria and the district decided to develop such a program itself. Using the language of the definitions that appeared in the previous section of the paper, the experience of the district in preparing the program might be described as follows:

> Since the final output of the proposed effort is to be an individualized and data-dependent reading program, the effort as a whole is developmental in nature. Enroute to program development, however, a variety of decisions need to be made; and, as in the case with all decision-makers, trustworthy information is desired in making them.
>
> As a consequence, formal data generating activities need to be undertaken. One type of data, for example, the attitudes of parents in the district and staff in the schools towards such a program, and the resources of the district that can be channeled into its development and operation, are of interest primarily to the district. According to the definitions provided earlier, the collection of such information should be considered as an evaluation activity, for there is little or no concern with its generalizability. There is concern with its reliability and validity, however, for without careful attention to such factors data simply are not trustworthy.
>
> Other data needed by a district in developing a program of this kind, and that would be of interest to other districts, are on the relationship between personality and background characteristics of children and their performance in a personalized reading program, and the effectiveness of various materials presentation strategies for various kinds of pupils. Data such as these, at least if they are to be generalizable and thereby of optimal use to other school districts, represent outputs of research activity. A decision to make such data available requires that the principles of experimental design accompany the data collection efforts. As in the case of information to be used in support of on-line decision-making, it also requires that acceptable standards of reliability and validity be demonstrated.
>
> Once the program has evolved to the point of its being workable within one school, a decision might be reached to place it in several others. At this point ways have to be found to get staff members who have not had a part in the initial development of the program to be able to understand what it is about, be

willing to use it, be able to adapt it to their own instruction, and to become competent in its operation. After employing a wide variety of diffusion strategies--for example, workshops around the new program, a chance to observe the program in operation, and installation in a second school on a trial base--it was decided that formal training in its operation had to be undertaken prior to its implementation. To carry out such training, carefully designed training programs were developed, field tested (evaluated), and then applied.

Assuming the validity of the illustration, it is clear that even problems of a relatively modest scope require some combination of the strategies of RDD&E for their solution.

The purpose of this section of the paper is to provide a framework for interactions between educational RDD&E as they are applied in real-world settings. In so doing it is proposed that two related interaction sets are needed to convey adequately the nature of these relationships: one which sees them as an interdependent set of problem solving activities; and, one which sees them as an intradependent set of problem solving activities.

1. RDD&E as a interdependent set of problem solving activities. As indicated in the Introduction to the paper and the example cited above, RDD&E seem to function as an interdependent set of problem solving activities--at least as they are brought to bear on problems of considerable scope. RDD&E as an INTERDEPENDENT SET of problem solving activities are defined as a situation-specific mix of research, development, diffusion, and/or evaluation activities that are coordinated over time so as to yield solution to a particular educational problem. Within such a view the particular combination of RDD&E activities relied upon in the solution of a particular problem, the particular intermeshing of those activities, and the particular sequence in which they are called upon, become situation-specific. Depending upon the nature of the problem being pursued RDD or E may be the initiating activity but, depending upon the strategy chosen for its pursuit, any of the other three activities may be called upon as follow-on or supporting activities. In the example cited, the school district could have decided to proceed with the development of the new curriculum before undertaking the related research and evaluation, or they could have reversed that order. And it may or may not have made any difference. The point is that while there is order and sequence to the use of RDD&E activities in the solution of a particular problem, the inclination to impose a particular order and sequence across problem solutions is full of risk. It may be, of course, that in time one or more linear patterns may be identified as particularly successful in the solution of a particular class of problems, but that is something to be hoped for. It has not as yet been observed.

Given such a view, the proposed framework is one which essentially incorporates the notions of the decision-oriented and linkage models described by Gideonse. The commitment to outputs as a basis for defining RDD&E activities clearly puts the proposed framework in the camp of the decision-oriented model. The view of RDD&E as a problem-specific network of interdependent activities also puts it in the camp of the linkage models described by Gideonse. The commitment to outputs as a basis for defining RDD&E activities clearly puts the proposed framework in the camp of the decision-oriented model. The view of RDD&E as a problem-specific network of interdependent activities also puts it in the camp of the linkage model.

2. RDD&E as a intradependent set of problem solving activities. In addition to viewing RDD&E as activities that can be called upon as a collectivity in the solution of large scale problems, or relied upon individually in the solution of smaller problems, it seems also to be the case that RDD&E can function as a collective set of problem solving activities within even the smallest research, development, diffusion, or evaluation effort. Any research project, for example, has instruments to *develop* and *evaluate*, observers to train, and results to *diffuse*. Any development project has materials to prepare and *evaluate*, and if that which is to be developed is for general use within a district, a State or the Nation, then *diffusion* will also enter the picture. Similar intradependencies exist within diffusion and evaluation efforts.

RDD&E as an INTRADEPENDENT SET of problem solving activites (RDD&E) are defined as *a situation-specific mix of research, development, diffusion, and/or evaluation activities that are coordinated over time so as to yield solutions to the particular problems within a particular RDD or E project.*[22] Within this framework, the outputs of rdd&e are the same as the outputs of RDD&E, except that they are usually smaller in scope and they are in service of a research or development or evaluation or diffusion activity, rather than an educational problem that extends beyond a single activity.

Operationally the interaction of rdd&e activites within a given RDD or E effort appears to assume much the same form as RDD&E assumes in the solution of a large scale educational problem, that is, they form a situation-specific network. While the parent activity may set some parameter on the particular pattern of rdd&e utilized in its support (for example, research as a parent activity may call in different use patterns than development or evaluation), it is likely that variation in the patterning of an rdd&e network is a function of the focus of the RDD&E activity being pursued and the strategy chosen for its pursuit.

Figure 1 illustrates schematically a network of rdd&e activities that could emerge in support of a research effort. As RDD&E are now being practiced in federally funded projects, a network of similar complexity would probably emerge within nearly all evaluation efforts; and, networks of considerably greater complexity would tend to emerge for development and diffusion efforts.

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[22] In the pages that follow whenever RDD&E is being discussed in terms of their intraproject dependencies they are identified as rdd&e. This notation is intended to facilitate the distinction between RDD&E as project activities that serve in the solution of large scale problems, i.e., problems that extend beyond a single project for their solution, and activities that serve in the solution of problems encountered within the conduct of a single project.

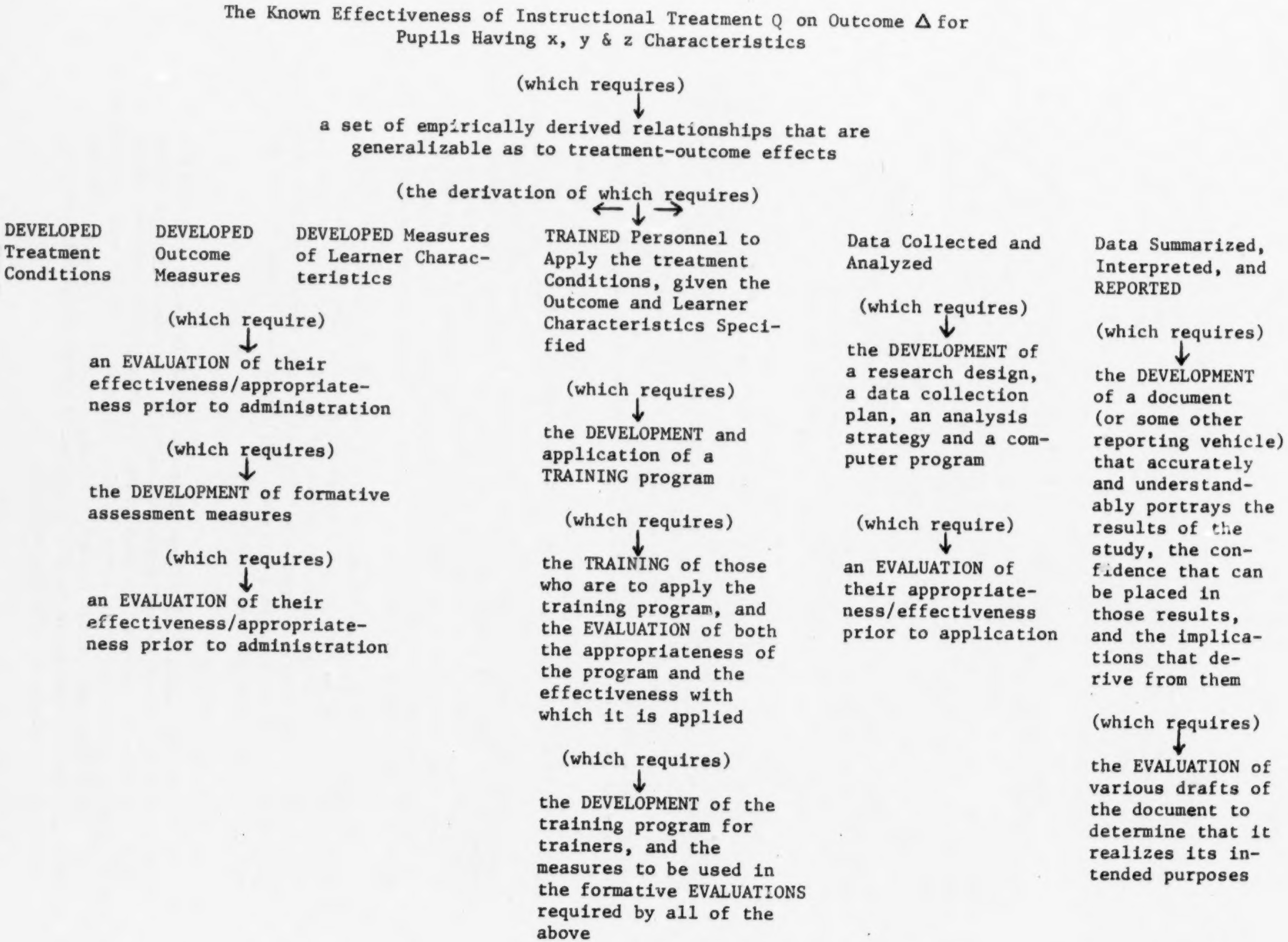
The Known Effectiveness of Instructional Treatment Q on Outcome Δ for Pupils Having x, y & z Characteristics
(which requires)
a set of empirically derived relationships that are generalizable as to treatment-outcome effects
(the derivation of which requires)
DEVELOPED Treatment Conditions
DEVELOPED Outcome Measures
DEVELOPED Measures of Learner Characteristics
(which require)
an EVALUATION of their effectiveness/appropriateness prior to administration
(which requires)
the DEVELOPMENT of formative assessment measures
(which requires)
an EVALUATION of their effectiveness/appropriateness prior to administration
TRAINED Personnel to Apply the treatment Conditions, given the Outcome and Learner Characteristics Specified
(which requires)
the DEVELOPMENT and application of a TRAINING program
(which requires)
the TRAINING of those who are to apply the training program, and the EVALUATION of both the appropriateness of the program and the effectiveness with which it is applied
(which requires)
the DEVELOPMENT of the training program for trainers, and the measures to be used in the formative EVALUATIONS required by all of the above
Data Collected and Analyzed
(which requires)
the DEVELOPMENT of a research design, a data collection plan, an analysis strategy and a computer program
(which require)
an EVALUATION of their appropriateness/effectiveness prior to application
Data Summarized, Interpreted, and REPORTED
(which requires)
the DEVELOPMENT of a document (or some other reporting vehicle) that accurately and understandably portrays the results of the study, the confidence that can be placed in those results, and the implications that derive from them
(which requires)
the EVALUATION of various drafts of the document to determine that it realizes its intended purposes

FIG. 1. A network of RDD&E activities that might emerge in support of a treatment-ascendent research project

3. RDD&E as a nested set of problem solving activities. The view of educational RDD&E as a set of problem solving activities that can be (a) brought to bear collectively for the solution of large scale educational problems, (b) applied individually to small scale problems, or (c) applied collectively in service of any particular research, development, diffusion, or evaluation problem leads to a second order formulation; namely, RDD&E as a NESTED SET of problem solving activities. Conceptually it appears that large scale educational problems beget large scale RDD&E efforts, and that within such efforts there are multiple layers of RDD&E and rdd&e activities--all of which have the characteristics of a collective network about them. When viewed as interacting layers of activity, they also assume the additional characteristic of hierarchical ordering. The concept of a nested set of activities seems to capture these properties well.

While helpful in conceptualizing the overall nature of educational RDD&E, the concept of nested sets provides little help in the operational problems one encounters in attempting to study such activities. One particularly difficult problem stemming directly from these properties is that of fixing the unit of observation, and the attendant problem of determining the decision rules to insure that that which one wishes to analyze can in fact be captured and manipulated. Put in other terms, the problem becomes one of identifying the unit of output that is of interest, identifying the boundary conditions for that output, and then placing that unit in the perspective of the larger output of which it is a part and the smaller outputs that comprise it. A set of decision rules that have been developed and used for this purpose are described in Volume V of the Oregon Studies.

Conceptual Set 3. Mechanisms

The first two conceptual sets that have been reviewed within the overall framework have dealt with the basic concepts of RDD&E and how they interact with one another in the solution of educational problems. Missing from the framework thus far is any mention of the organization and operation of such activities, and the resources needed to support them. Also missing from the discussions thus far is any reference to the mechanisms or vehicles that carry such activities. The purpose of Conceptual Set 3 is to provide a way of looking at such mechanisms. The purposes of Conceptual Sets 4 through 6 deal with the issues of the input, output, and operation of mechanisms; Conceptual Set 7 deals with the matter of their organization.

The assumptions underlying the development of this particular conceptual set within the framework are the same as those which underlie all of the others, namely, that a major source of variation in the operations required to carry out educational RDD&E is the nature of the mechanisms or vehicles that carry those activities, and that a framework designed to map the domain of educational RDD&E must be able to accommodate that source of variation.

By level. By and large the vehicle that carries the bulk of educational RDD&E in the Nation at this point in time is the project (Cook, 1971). PROJECT is defined as *a formal or recognized unit of operation within which resources are brought to bear on and activities coordinated in the solution of a given problem within a given time period.*[23] So defined, a project may be large or small, well or poorly financed, strongly or weakly staffed, or one or several foci, linked to or independent of related projects, housed within or outside of established institutions. All such factors are seen as potential sources of variation in the operation of RDD&E projects and are dealt with in further detail in the paragraphs which follow.

Another vehicle that carries RDD&E activities is that of a program, with PROGRAM defined as *a formal or recognized unit of operation within which resources are brought to bear on and activities coordinated in the pursuit of two or more projects that have a common focus*. Within the present framework, it is proposed that two major classes of programs exist: those which are institutionalized and those which are project dependent. Institutionalized programs are those which have their resource base tied to a programmatic or goal-oriented effort rather than the specific projects which constitute it. Project dependent programs are those whose resource base is tied to the specific projects that comprise it. The program of work at the University of Wisconsin's Educational R&D Laboratory in cognitive learning, or in Harry Harlow's laboratory on the relationship between early learning experiences and later love relationships in primates are illustrative of institutionalized programs. The "programs" established inside most university departments, or in R&D centers that operate within the private sector, tend to be illustrative of project dependent programs. Both kinds of programs can be found, of course, within university settings, public school settings, State departments of education, and the private sector.

---

[23] Cook cites a number of related definitions by Gaddis, Woodgate, and Robertson, respectively:

> ". . .(an) organizational unit dedicated to the attainment of a goal--generally the successful completion of a development product on time within the budget, and in conformance with performance specifications."
>
> ". . .work to be done or procedures to be followed in order to accomplish a particular (project) objective."
>
> ". . .the accomplishment of a number of actions in series and/or parallel in order to reach an objective (p. 4)."

He also identifies four characteristics of projects which help differentiate them from most nonproject activities: they are usually finite in nature; they are usually complex in nature; they usually involve a series of tasks which relate only to that effort; and, they generally consist of a once-through, nonrepetitive, or a one-of-a-kind activity.

Another vehicle which carries RDD&E activities is that of the institution. INSTITUTION is defined as a formally constituted and recognized unit of operation within which two or more programs of R,D,D and/or E rest, and which assumes its primary identity from these programs. The federally supported education R&D centers and laboratories are cases in point. So are institutions such as The American Institutes for Research, Educational Testing Service, the Laboratory of Educational Research at the University of Colorado, the Teaching Research Division of the Oregon State System of Higher Education, Systems Development Corporation, and the Rand Corporation.

As educational RDD&E is now moving, it is probable that projects will be housed increasingly within a program framework, and that programs will be housed increasingly within specialized RDD and/or E institutions.

In the present framework it is proposed that two factors associated with project/program/institution definition account for much of the variation observed in such mechanisms; namely, their identity and their level of complexity.[24]

Project identity. It is proposed that three factors contribute to the identity of any given project: (a) its focus, that is, whether it carries a research, development, diffusion, and/or evaluation emphasis: (b) the setting in which it rests, that is, whether it is within a school, a college, an R&D center, an educational laboratory, or a State department of education; and, (c) its linkage to the setting in which it rests, that is, whether it is "appended" to its setting (in the sense that it is external to the critical function and/or operation of the setting), or whether it is an integral part of its setting. The three-dimensional scheme that appears in Figure 2 is intended to illustrate the interaction of these factors as they influence the identity of a particular project. The premise underlying the scheme is that operations will vary with project identity and that those who attempt to work within projects, train others to work within them, or study them need to be aware of that possibility so as to accommodate for the variation in operations that is likely to derive therefrom.

Project complexity. As in the case of project identity, the concept of project complexity is introduced as a means of organizing a set of factors that are assumed to be associated with variation in the operations required to carry out any given project. Three factors contribute to a project's complexity: (a) its resource base; (b) the interprogram or interinstitutional alignments that are made or needed in its conduct; and (c) the output commitments that coerce it. The three-dimensional scheme that appears as Figure 3 is intended to

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[24] To simplify language, the discussion of project/program/institution identity and complexity involve only the term project. It is anticipated, however, that these concepts are equally applicable to programs and institutions.

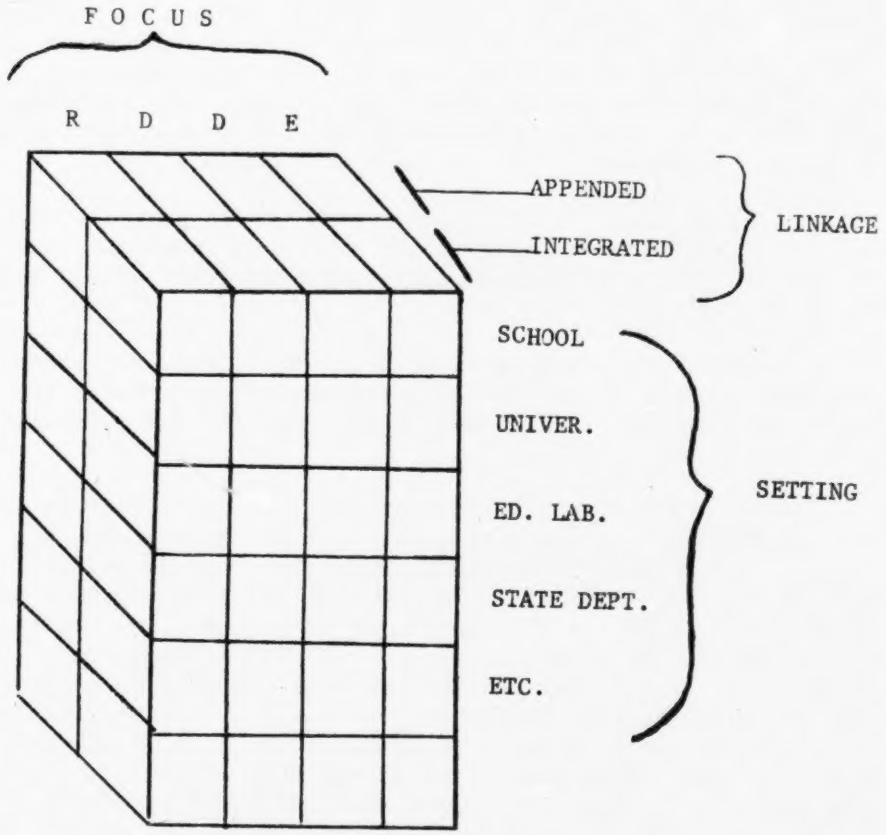
FOCUS
R
D
D
E
APPENDED
INTEGRATED
LINKAGE
SCHOOL
UNIVER.
ED. LAB.
STATE DEPT.
ETC.
SETTING

FIG. 2. The dimensions of a project that contribute to its identity.

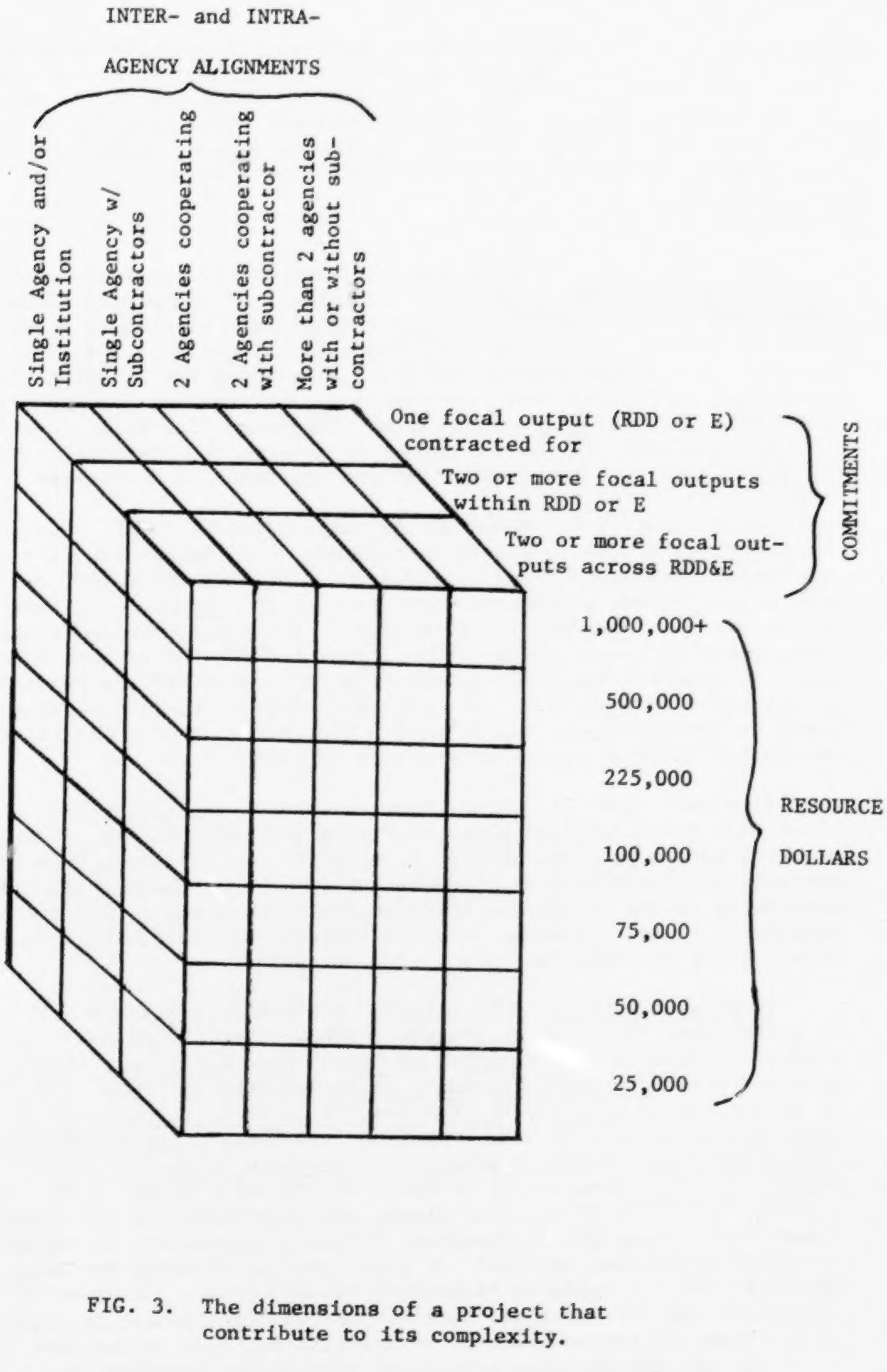
INTER- and INTRA-
AGENCY ALIGNMENTS
Single Agency and/or Institution
Single Agency w/ Subcontractors
2 Agencies cooperating
2 Agencies cooperating with subcontractor
More than 2 agencies with or without subcontractors
One focal output (RDD or E) contracted for
Two or more focal outputs within RDD or E
Two or more focal outputs across RDD&E
COMMITMENTS
1,000,000+
500,000
225,000
100,000
75,000
50,000
25,000
RESOURCE
DOLLARS

FIG. 3. The dimensions of a project that contribute to its complexity.

illustrate the interaction of these factors. The premise underlying the scheme is that as the resource base of a project increases, as intra- and interinstitutional alignments increase, and as the range or magnitude of project commitments increase, the complexity of a project will increase. A further premise is that as project complexity increases, so too will the operations required to carry it out.

Conceptual Set 4. Outputs

The conceptual sets thus far described provide analytic tools for mapping the "external" features of the domain of educational RDD&E. The definition set provides the means for labeling a particular problem solving activity as research, development, evaluation, or diffusion; the interaction set provides the means for describing the relationship between such activities; and, the mechanism set provides the means for describing vehicles which carry them. Conceptual Set 4 is the first of four sets that provide the means for mapping the "internal" features of RDD&E, that is, the organization and operation of mechanisms.

Conceptual Set 4 focuses on the output side of RDD&E. Its purpose is to provide a generic set of descriptors that can be used in mapping the output structure of any research, development, diffusion, or evaluation project (or program or institution). The role of this set in the overall framework is pivotal, for it provides the necessary follow-through to the output definitions of RDD&E and it maps that which is probably the major source of variation within the operation of any particiular project. The premise on which this last statement rests is the relatively simple notion that what one needs to produce determines in large part what one does to produce it.

A two-way classification scheme is used in mapping project outputs: (a) a category set that identifies the major classes of outputs emerging from a project, and (b) a category set that identifies the patterns or hierarchies of those outputs. Each of these is discussed separately in the paragraphs which follow. The section closes with a discussion of the standards held for outputs and their anticipated relationship to variation in project operation.

Classes of outputs. The outputs of RDD&E projects are able to be sorted into one of three classes: product, event, or condition. PRODUCT is defined as a tangible or "hard" outcome of work effort that survives in a form that makes it transportable; EVENT is defined as an outcome of work effort that results in the occurrence of an observable transaction; and, CONDITION is defined as an outcome of work effort that creates a desired circumstance or environmental characteristic. Examples of products are reports, memos, drafts of reports, hardware, films, test items, and data-gathering instruments. Examples of events are conferences, formal announcements of management or policy decisions, speeches (as given, not as recorded on tape), seminars, and all types of transitory communication. Examples of conditions are circumstances such as parental involvement in a preschool program, the achievement of learning outcomes on the part of children, and the creation of various working environments that support the operation of a project.

The listing of outputs that are associated with a particular project is referred to as an OUTPUT INDEX. Table 6 contains such an index for a relatively small research project (per annum expenditure of less than $100,000) and Table 7 contains an output index for a moderately sized development project (per annum expenditure between $175,000 to $200,000). Output indexes for evaluation and diffusion projects, as well as for larger research and development projects, appear in the case profiles prepared for the 20 projects described in the Oregon Studies.[25]

Patterns of outputs. In addition to outputs differing in kind within a particular project, they also assume markedly different positions. Some outputs assume the position of a contractually targeted output. Others assume the position of being a component of a targeted output. Still others are simply facilitating to either targeted or component outputs. In all cases, however, every output that is associated with or emerges from a project can be placed in a patterned or hierarchically ordered network.

Within the present conceptual set, a four level classification scheme has been used to identify the position held by each output identified within a particular project: a focal position, a terminal position, a component position, or a facilitating position. A FOCAL OUTPUT is defined as *an outcome of work effort expected by contractual obligation to emerge from a project*; TERMINAL OUTPUT is defined as *an outcome of work effort that constitutes a focal output, an essential part of it, or a prerequisite to it*;[26] a COMPONENT OUTPUT is defined as *an outcome of work effort that constitutes an element of or one step in the approximation to a terminal output*; and a FACILITATING OUTPUT is defined as *an outcome of work effort that is supportive to the generation of focal, terminal, and/or component outputs, but is not in itself an instance of such outputs*. Any output at any level may assume the form of either a product, an event, or a condition.

The mapping of outputs associated with a particular project according to the positions they hold within it results in what has been termed an OUTPUT MAP. Each map depicts graphically the hierarchical and functional dependencies of outputs within a given project. Figures 4 and 5 represent, respectively, the output maps for the projects whose outputs were indexed in Tables 6 and 7. As in the case of output indexes, all 20 case profiles prepared within the Oregon Studies contain output maps.

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[25] Relatively small projects were included for illustrative purposes in the present paper in deference to the length of output indexes. Output indexes for large projects, that is, for projects with a funding base of over $500,000 per annum, have as many as 250 listings.

[26] Focal outputs are, therefore, one type of terminal output. Although terminal outputs which have not been specifically contracted for may also emerge from projects, the identification derived from empirical data, exemplified in Figures 4 and 5, shows only focal outputs.

TABLE 6

An Output Index for a Small Research Project[a]

001	Final Report
002	Description of Analysis Techniques
003	Interpretative Report
004	Computer Printouts
005	Computer Programs
006	Design of Statistical Treatments (2)
007	Statement of Variables and Parameters (2)
008	Literature Survey (2)
009	Raw Data
010	Theory Papers (2)
011	Quarterly Progress Reports (4)
012	Budget
013	Financial Report
014	Schedule[b]

---

[a] A project that is being conducted by the Educational Testing Service. This is one project in a program of research that seeks to study the patterns and theories of stability and academic growth among student populations. The project describes academic growth and development of students using longitudinal data collected in a previous study. Dr. T. L. Hilton is serving as Project Director.

[b] Obviously, this list does not include all of the outputs that will emerge from the project. Initial, inhouse draft copies of the various documents cited are not included, nor are routine or incidental memos, informal planning sessions, etc. The criteria and decision rules governing the selection of outputs for inclusion in an output index for a particular project are reported in Volume V of the Oregon Studies.

TABLE 7

An Output Index for a Moderately Sized Development Project[a]

Products:

001	Final Catalog of Performance Objectives in English, Grades 9-12
002	Commercially-published Edition of Performance Objectives in English, Grades 9-12
003	Final Report of the Project
004	Field Test Data from Use of Preliminary Catalog
005	User Questionnaires
006	Teacher Annotated Catalogs
007	Interview Questionnaire (Guide to interviewers)
008	Interviewer Written Reports
009	Preliminary Catalog
010	Refined (Conference 2) Approximation to Catalog
011	Modified Field Test Plan
012	Video Tape Critique of First Draft of Performance Objectives
013	First Draft of Chapters for the Catalog
014	Journal Report (Project Officer)
015	Journal Report of Project Progress (Project Director)
016	Dissenting Position Paper (Journal Article)
017	Response to Dissenting Position Paper (Journal Article)
018	First Draft of Introduction to Catalog
019	Agenda for Initial Conference
020	Outline of Catalog Goals, Objectives and its Organization & First Draft
021	Examples of Performance Objectives
022	Initial Statement of Goal Areas for English
023	Initial Field Test Plan
024	List of Field Test Sites
025	List of Consultants (Confirmed)
026	Proposal

Events:

027	Conference, Field Representatives
028	Initial Work Conference (October)
029	2nd Work Conference (March)
030	Field Use of Preliminary Catalog

---

[a] A project that is being carried out jointly by staff from the University of Illinois, the University of Indiana, and Purdue University. It employs a strategy of development that involves a wide range of college and school personnel in the development process. Dr. J. N. Hook, University of Illinois, serves as Project Coordinator.

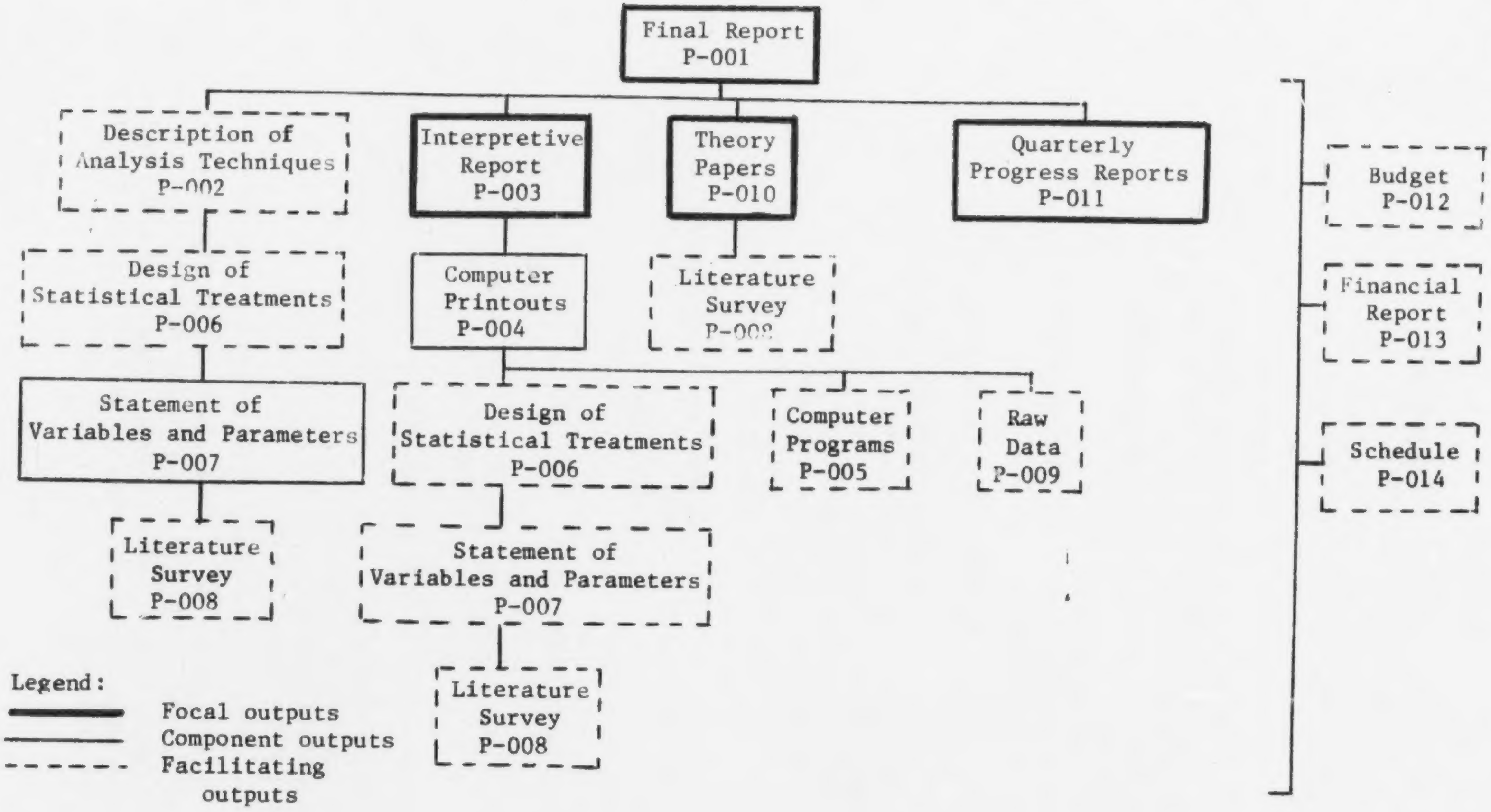
Final Report
P-001
Description of
Analysis Techniques
P-002
Interpretive
Report
P-003
Theory
Papers
P-010
Quarterly
Progress Reports
P-011
Budget
P-012
Financial
Report
P-013
Schedule
P-014
Design of
Statistical Treatments
P-006
Computer
Printouts
P-004
Literature
Survey
P-008
Statement of
Variables and Parameters
P-007
Design of
Statistical Treatments
P-006
Computer
Programs
P-005
Raw
Data
P-009
Literature
Survey
P-008
Statement of
Variables and Parameters
P-007
Literature
Survey
P-008
Legend:
Focal outputs
Component outputs
Facilitating
outputs

FIG. 4. An output map for a small research project (see Table 6).

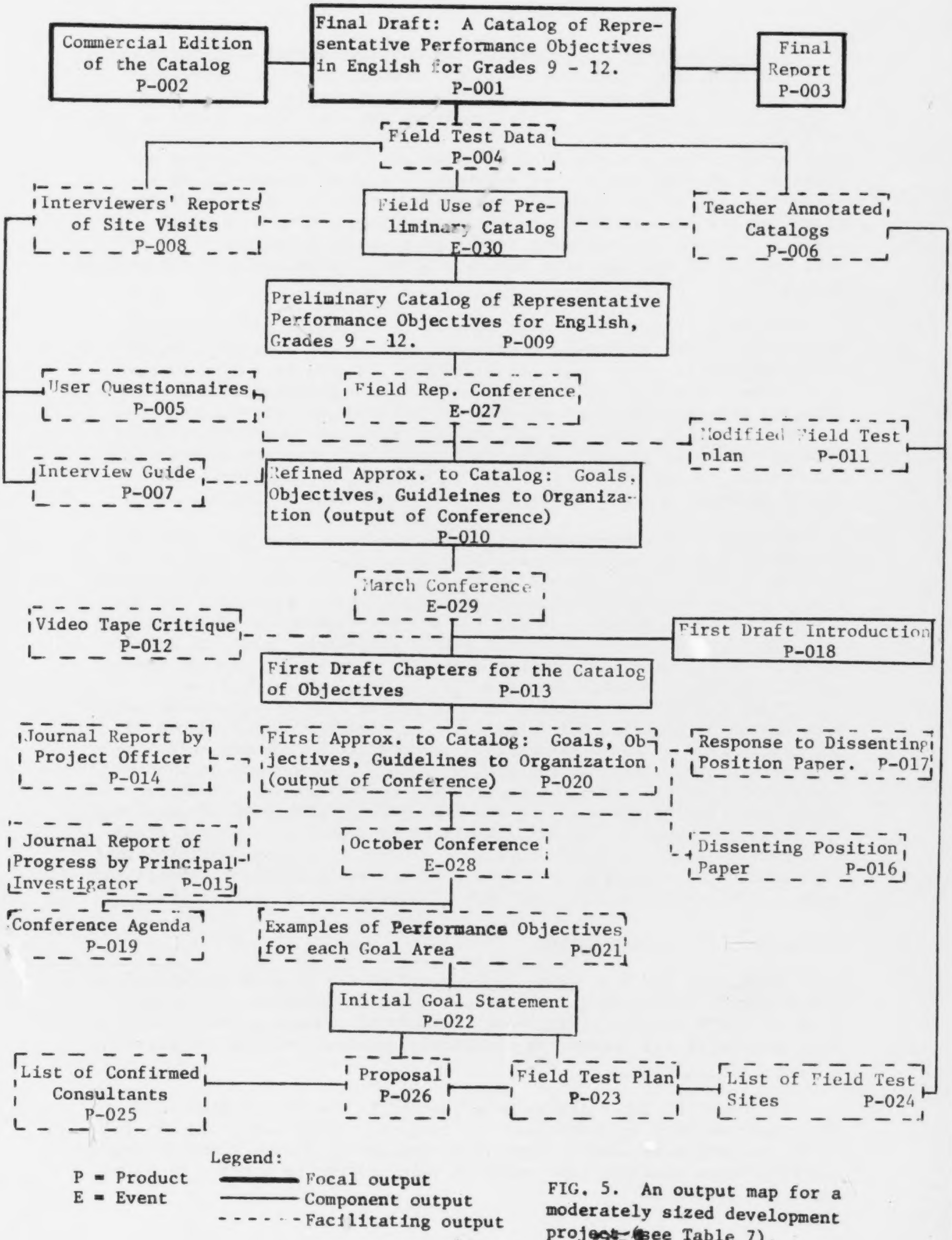
Commercial Edition of the Catalog P-002
Final Draft: A Catalog of Representative Performance Objectives in English for Grades 9 - 12. P-001
Final Report P-003
Field Test Data P-004
Interviewers' Reports of Site Visits P-008
Field Use of Preliminary Catalog E-030
Teacher Annotated Catalogs P-006
Preliminary Catalog of Representative Performance Objectives for English, Grades 9 - 12. P-009
User Questionnaires P-005
Field Rep. Conference E-027
Modified Field Test plan P-011
Interview Guide P-007
Refined Approx. to Catalog: Goals, Objectives, Guidleines to Organization (output of Conference) P-010
March Conference E-029
Video Tape Critique P-012
First Draft Introduction P-018
First Draft Chapters for the Catalog of Objectives P-013
Journal Report by Project Officer P-014
First Approx. to Catalog: Goals, Objectives, Guidelines to Organization (output of Conference) P-020
Response to Dissenting Position Paper. P-017
Journal Report of Progress by Principal Investigator P-015
October Conference E-028
Dissenting Position Paper P-016
Conference Agenda P-019
Examples of Performance Objectives for each Goal Area P-021
Initial Goal Statement P-022
List of Confirmed Consultants P-025
Proposal P-026
Field Test Plan P-023
List of Field Test Sites P-024
Legend:
P = Product
E = Event
Focal output
Component output
Facilitating output

FIG. 5. An output map for a moderately sized development project (see Table 7).

Output Standards. In addition to outputs varying as to kind and position held, they also vary as to the standards they are produced against. STANDARDS are defined as the criteria applied to, or level of excellence expected of, a particular output. As such, standards may be explicit--in the form of criterial attributes and rules of evidence pertaining to the demonstration of those attributes--or they may be implicit. Whether explicit or implicit, a working assumption of the framework is that the standards set for a particular output influence significantly the nature of the operations required to produce the output. As such they become a significant source of variation in project operations and thus must assume a place of prominence in the overall framework.

Contrary to other potential sources of variation that have been dealt with in the framework, a category set has not been established to differentiate types of output standards. A good deal of data have been collected within the Oregon Studies about standards, and descriptive category sets have been established for their first order coding. But, as yet, no logical structure has emerged from these descriptive codes that permit their classification in terms of higher order abstractions. This is not to say that such a code is unneeded or undesired. It simply reflects the incomplete state of development of the framework.[27]

Because of the potentially powerful role that standards play in the design and implementation of RDD&E activities, a word needs to be said about our efforts to collect data on them. Of all the information sought in the Oregon Studies, that which focused on standards was the most difficult to obtain. In the few projects where standards had been made explicit such information was easily collected. Also, in cases where standards were implicit but generally understood, persons interviewed were able to state them readily. In most cases, however, interviewees found it difficult to make public both the standards they were operating upon and the indicators they looked to as evidence of the realization of those standards. Because of the assumed relationship between standards and project operations, and because of the intimate relationship between standards and project impact, it would appear that one of the simplest yet most far-reaching ways of improving the impact of RDD&E in education would be to insist that output standards for at least the focal outputs of a project be made explicit, that the indicators acceptable as evidence of the realization of those standards also be made explicit, and that such evidence be demonstrated.

Conceptual Set 5. Operations

Conceptual Set 4 provided descriptors of the outputs associated with a particular project. Conceptual Set 5 is intended to provide a set of tools for describing what it takes to produce those cutputs. This conceputal set assumes an extrememly critical role in the overall framework, for it describes the work that is done within the context of RDD&E activities.

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[27] Over 100 interviewees were queried in the Oregon Studies as to the standards they held for over 250 outputs. These data, and the first order category sets used to code them, appear in Volumes I and IV reporting the Oregon Studies. The decision rules governing their collection appear in Volume V.

As in the case of project outputs, a four level classificatory structure is used to describe operations. These include category sets that describe (*a*) the major functions that need to be executed within any project, (*b*) the activities engaged in to carry out those functions, (*c*) the tasks pursued to carry out a particular activity, and (*d*) the actions involved in carrying out a particular task. Operationally, these sets of categories are interdependent and hierarchially ordered and provide, thereby, a description of project operations that varies from a gross to a minute level of detail. They also represent category sets that "do double duty" in the sense that they are used to describe project operations as a whole as well as operations pursued in the generation of a particular output. This dual purpose of the category sets is discussed in some detail in the paragraphs which follow.

Functions. Drawing upon the experience of industry, three separate though mutually supporting functions are proposed as operating within all projects: production, management, and policy setting. POLICY SETTING is defined as *the establishment of standards for the focal output(s) of a project, the allocation of resources toward the realization of that output, and the establishment of guidelines as to the desired procedures to be followed in and anticipated consequences to derive from the project as a whole*. The function of MANAGEMENT is defined as *the orchestration of the energy, time, materials, facilities, and information available to a project so as to optimize desired outcomes and minimize undesired outcomes*. The function of PRODUCTION is defined as *the execution of the operations required to achieve a planned outcome of a project, given the constraints and facilitators provided by policy and management*. The relationship of these three functions to the outputs of a particular project are shown schematically in Figures 6 and 7. The classification of the outputs identified in the two projects that have been used for illustrative purposes by the function they serve is summarized in Tables 8 and 9. The decision rules governing their application appear in Volume V reporting the Oregon Studies.

Three observations need to be made in relation to this particular category scheme. First, as seen in Figure 7, outputs can be mapped in terms of their production, management, and policy-setting functions. Operationally, this requires a refinement of the output maps illustrated in Figures 4 and 5 by ordering them according to the schema outlined in Figure 7. By so doing, a map of finer detail is provided.

The second observation made is one that is fairly obvious by now. Outputs receive classifications beyond those given them by the category set specifically designed to describe them, i.e., Conceptual Set 4. Classification as to the function they serve is a case in point; so, too, is their classification according to the RDD&E-rdd&e taxonomy, i.e., Conceptual Sets 1 and 2.

The third observation is that policy and management functions do not seem to stand high in the awareness of project staff; but, to the extent they do, awareness seems to be in direct proportion to project size. On the basis of the experience gained in the Oregon Studies it is also our impression that educational RDD&E personnel are relatively naive about the matters of policy and management.[28]

Activities, tasks, and actions. The category set describing functions is intended to order in a gross way the operations that need to be carried out for either a project to be completed or an output to be produced. Three additional category sets are employed within the conceptual framework to describe in detail the operations required to produce specific outputs: one that describes the activities involved, one that describes the tasks involved, and one that describes the actions involved. ACTIVITIES are defined as the largest meaningful units of work engaged in to carry out a particular function; TASKS are defined as the largest meaningful units of work engaged in to carry out an activity; and ACTIONS are defined as the largest meaningful unit of work engaged in to carry out a task.

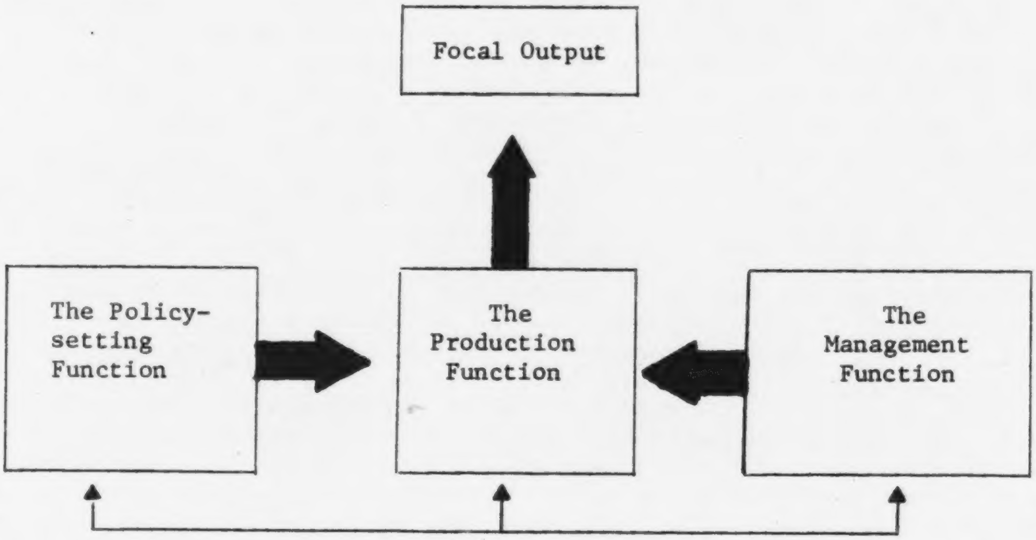

FIG. 6. The relationships among policy-setting, management, and production functions with reference to the focal output of a project.

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[28] Desmond Cook's recent book Educational Project Management provides a good deal of information about the "nuts & bolts" of project management (Cook, 1971). He does not deal, however, with major conceptual or theoretical issues relating management to policy and production, or combinations thereof. For references that do attempt to deal with such matters, see Adams (1960), Argyrus (1960), Etzioni (1960), Griffiths (1964), Cockcroft (1965), and Hemphill (1970).

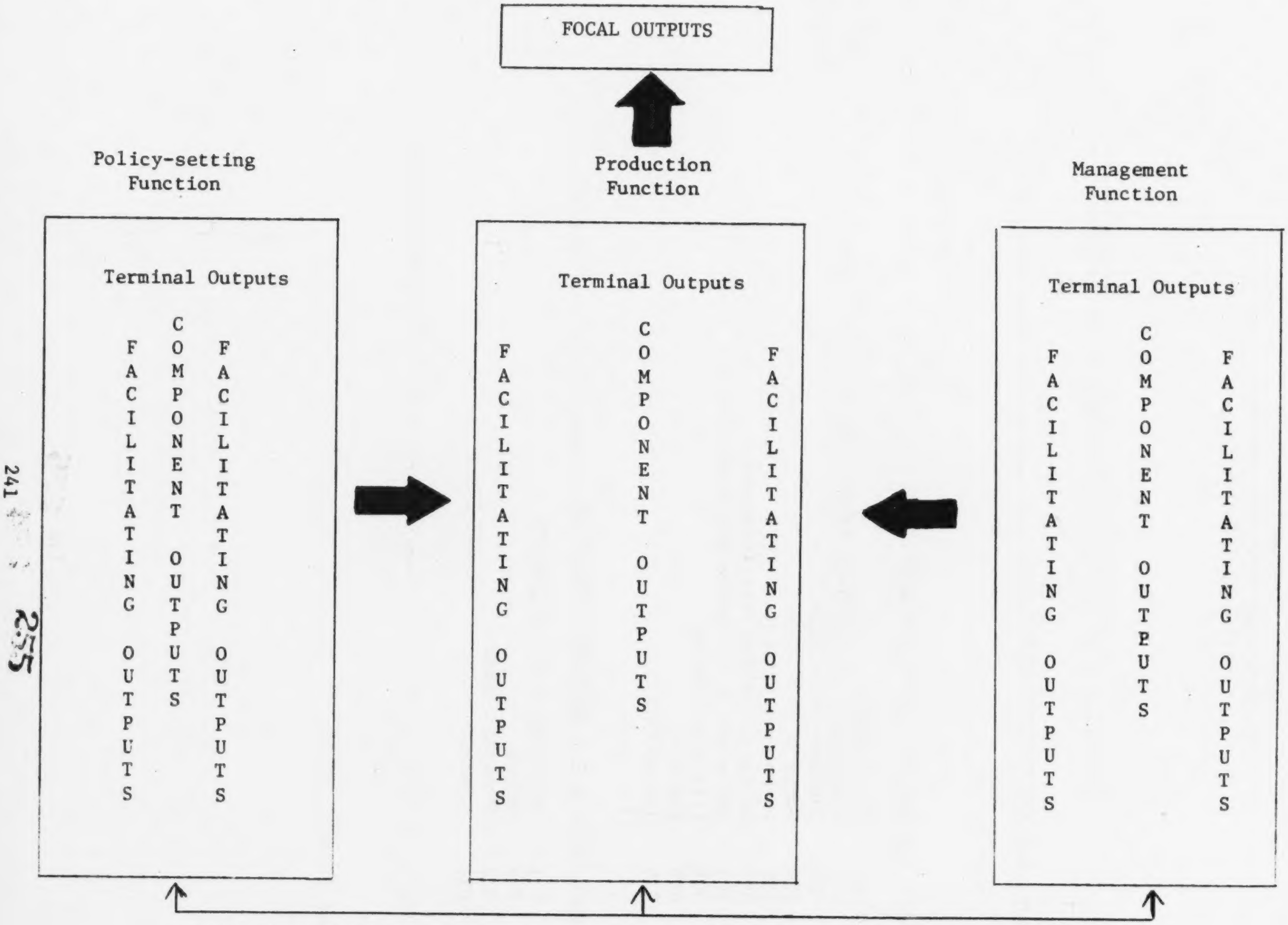
FOCAL OUTPUTS
Policy-setting Function
Production Function
Management Function
Terminal Outputs
FACILITATING OUTPUTS
COMPONENT OUTPUTS
FACILITATING OUTPUTS
Terminal Outputs
FACILITATING OUTPUTS
COMPONENT OUTPUTS
FACILITATING OUTPUTS
Terminal Outputs
FACILITATING OUTPUTS
COMPONENT OUTPUTS
FACILITATING OUTPUTS

FIG. 7. The relationship among focal, terminal, component, and facilitating outputs as they are positioned in service of policy-setting, management, and production functions.

TABLE 8

Outputs of a Small Research Project Ordered by the Function Each Output Serves[a]

Outputs Serving the Policy Function

(none noted)

Outputs Serving the Production Function

001	Final Report
002	Description of Analysis Techniques
003	Interpretative Report
004	Computer Printouts
005	Computer Programs
006	Design of Statistical Treatments
007	Statement of Variables and Parameters
008	Literature Survey
009	Raw Data
010	Theory Papers

Outputs Serving the Management Function

011	Quarterly Progress Reports
012	Budget
013	Financial Report
014	Schedule

---

[a] See Table 6.

TABLE 9

Outputs of a Moderately Sized Development
Project Ordered by the Function
Each Output Serves[a]

Outputs Serving the Policy Function	
014	Journal Report (Project Officer)
Outputs Serving the Management Function	
003	Final Report
004	Field Test Data from Use of Preliminary Catalog
006	Teacher Annotated Catalogs
008	Interviewer Written Reports
011	Modified Field Test Plan
012	Video Tape Critique of First Draft of Performance Objectives
015	Journal Report of Project Progress (Project Director)
016	Dissenting Position Paper (Journal Article)
017	Response to Dissenting Position Paper (Journal Article)
019	Agenda for Initial Conference
023	Initial Field Test Plan
024	List of Field Test Sites
025	List of Consultants (Confirmed)
026	Proposal
Outputs Serving the Production Function	
001	Final Catalog of Performance Objectives in English, Grades 9-12
002	Commercially Published Edition of Performance Objectives in English, Grades 9-12
005	User Questionnaire
007	Interview Questionnaire (Guide to interviewers)
009	Preliminary Catalog
010	Refined (Conference 2) Approximation to Catalog
013	First Draft of Chapters to Catalog
018	First Draft of Introduction to Catalog
020	Outline of Catalog: Goals, Objectives, and its Organization and First Draft
021	Examples of Performance Objectives
022	Initial Statement of Goal Areas for English
027	Conference, Field Representative
028	Initial Work Conference (October)
029	2nd Work Conference (March)
030	Field Use of Preliminary Catalog

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[a] See Table 7.

Defined in this way the concepts of activities, tasks, and actions are simply labels that pertain to increasingly refined or detailed descriptions of work performed by project staff to produce specified outputs. The have no absolute referents as to size or substance since they are tied to outputs, and outputs vary endlessly on both counts. As a consequence, the boundary conditions that define a particular level of operation are relatively flexible and open to influence from project (output) characteristics. The decision rules governing application of the category set are also reported in Volume V of the Oregon Studies.

As in the case of output standards, formal category sets that differentiate classes of activities or tasks have not as yet been established within the framework. Data have been collected on the activities and tasks that people have engaged in to produce over 350 outputs, and these data have been coded in first order descriptive category sets. However, logical structures that would permit the description of tasks and activities at a higher order of abstraction have not been developed from these codes. The descriptive categories used in the Oregon Studies to code the task and activity data are described in Volumn V of the Oregon Series on RDD&E. The data collected on tasks and activities, by output, appear in Volume I.

Conceptual Set 6. Inputs

Using the standard input-operation-output language of systems analysis, conceptual sets have been provided thus far for the description of the output and operation dimensions of projects. The purpose of Conceptual Set 6 is to draw attention to the input side of the equation. The term "draw attention to" is used advisedly in this case for little has been done thus far in the development of the framework to conceptualize the nature of project inputs. As a consequence, this section of the paper is primarily intended to alert the reader (a) that project input represents a critical dimension of the RDD&E process, (b) that it can be mapped in much the same way that the output and operations dimensions can be mapped, and (c) that because of its criticalness, the conceptual tools needed for its mapping should be created. The following observations are intended only as suggestions as to what some of the critical dimensions of project input might be.

Broadly speaking project input can be equated with the resource base available to a project. From one aspect, resource availability can be equated with dollars, for it is with dollars that time, personnel, and support systems are purchased. From another aspect, however, resource availability goes much beyond dollars and cents. In some cases time and talent can be purchased and in others they cannot. Sometimes it is possible to gain access to the support systems needed for project operation (for example, high speed or large-storage computer capability, on-call access to subjects of field test populations, immediate turn-around time for reproduction or printing), and sometimes it is not. From this point of view the nature of resource accessibility and use becomes a critical dimension of project operation.

Another dimension of input to project operation, and the only dimension with which the framework currently deals, is the matter of the knowledges, skills, and sensitivities that project personnel bring to their tasks. In some respects this may be the most critical of all project inputs, for its relationship to project operation, and thus project output, is essentially a direct one. Knowledges, skills, and sensitivities have been conceptualized as ENABLERS of work performance, and, therefore, defined as prerequisites to the performance of the functions/activities/tasks/actions that are required to produce a particular output. Operational definitions, decision rules, etc. governing the application of this category set are reported in Volume V of the Oregon Series. Volumes I and IV report the data collected through their application. As in the case of output standards and descriptors of work (activities, tasks, actions), no category sets have as yet been developed that differentiate within classes of enablers.

Much has yet to be done in the conceptualization of project inputs. With a concept as complex as this, there are undoubtedly a wide range of variables to be dealt with, and a wide range of options as to how best to deal with them. The purpose of this conceptual set is to sensitize the reader to the criticalness of the input dimension of project operation and encourage that it be addressed systematically and in some detail. Once more fully conceptualized, it needs to be added to the other category sets that comprise the framework and applied to the overall task of mapping the internal workings of the domain of educational RDD&E.

Conceptual Set 7. Organization

One other source of anticipated variation within the domain of educational RDD&E is the manner in which projects/programs are organized for work. To do that which they must do, projects (a) organize their resources, and (b) organize their work into manageable units. How they go about doing this varies a great deal. And, it may well be that how they go about doing it affects in a significant way both the nature of project outputs and how those outputs get produced.

This final conceptual set in the present framework provides for the description of the manner in which projects are organized. As in the case of Conceptual Set 6, however, Conceptual Set 7 is intended only to "draw attention to" the need to consider project organization.

As a point of departure, it appears that nearly all RDD&E projects are organized around three dimensions: a policy dimension, an administrative or management dimension, and a work responsibility or job dimension.[29]

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[29] These parallel the policy-setting, management, and production functions elaborated under Conceptual Set 5. As dealt with there they served essentially as first-level organizers for viewing what people do to effect project output. Here they are intended to serve as guides for viewing how people organize themselves and their work to effect project output.

Moreover, it appears that all three dimensions vary as a function of a project size, the nature of focus of a project, and the particular style preferences of the person or persons responsible for project management and/or policy-setting. Some projects, for example, establish formal organizational units for purposes of administration and policymaking, whereas others operate with very informal units. In some cases such units are purposefully kept small while in others they are allowed to grow large. And the terminology for such units seems to vary as widely as the organizational structures themselves. Labels such as boards, councils, and commissions in the case of policy-setting, and divisions, departments, units, areas, and sections in the case of administration seem to be applied interchangeably. The one constant that seems to exist with respect to organization for administration and policy making is that, as projects increase in size, differentiated structures to handle these matters seem to emerge. In a one-man project the need for such differentiation is minimal; in a 50-man project it is a necessity (Cockcroft, 1965).

The same diversity seems to hold with respect to job definitions. With the exception of the job of Project or Program Director, jobs seem to be defined primarily in response to the peculiar demands of a particular project or the style of those responsible for its management. Jobs seem to be defined differently by different organizations, and, within a single organization, differently for different projects. It is also common for jobs to change definition several times within the life of a project. As a consequence, jobs seem to be even less stable in their definition than units of administration and policy making. Job definitions nevertheless form a significant organizational framework within a project, and it would seem essential that they be included in a complete mapping of the domain of educational RDD&E.[30]

This completes the description of the various conceptual sets that make up the proposed framework for the analysis and empirical investigation of educational RDD&E. In recap form, the first three of the seven sets are designed to map the external parameters of that domain; the last four its internal parameters. It is the thesis of the paper that in combination these sets are exhaustive, that is, they provide the conceptual tools needed to map sensitively the entire domain. This is a thesis to be tested, however, and it is the view of the authors that by testing it the tools of educational RDD&E will be sharpened significantly. Thus construed, the framework must be viewed as provisional, inviting of empirical test. The rationale underlying such a view is outlined in the Introduction to the paper.

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[30] The relative instability of job definitions within RDD&E makes them unsuitable as a unit of analysis for performance operations. As a consequence, in the Oregon Studies, operations data and data on the knowledges, skills, and sensitivities needed to perform those operations were collected against specific outputs rather than job definitions. The rationale for this strategy was straightforward: outputs are tangible, relatively stable entities against which work can be described and performance assessed. While subject to project-specific variation, an output, or a class of outputs, is likely to serve a larger number of projects. As a consequence they appear to provide better (more stable, generalizeable) units of observation and analysis than do job definitions.

The Parable of the Roads

> "Would you tell me, please, which way
> I ought to go from here?" (asked Alice.)
>
> "That depends a good deal on where you
> want to get to," said the Cat.

The exchange between Alice and the Cat is most fitting as an introduction to the last section of the paper, for in the writers' judgment, educational RDD&E is at a cross roads. From our view there are three reasonably well defined roads which can be followed, though none promises a particularly smooth ride.

The first is the road that has characterized educational RDD&E historically. To a large extent this is a road dominated by classical research design and classical research interests in education, for example, acquisition and retention studies, transfer studies, teacher characteristics studies, and teacher behavior studies. Evaluation, development, and diffusion, as these concepts have been discussed in the present paper, are largely missing. In the light of the present day this is a relatively narrow road and one that is marred by potholes, blind corners, and an almost nonexistent sign post system alerting the traveler as to where he is going.

The second road that is open to travel by educational RDD&E personnel is one that has been opened only recently and one that is not as yet completed. This is the road that takes the form of a superhighway begun less than a decade ago and has lanes accommodating not only research, but development, diffusion, and evaluation, as well. And, each lane of the superhighway is sufficiently wide and well-surfaced so as to accommodate new, high speed, high powered, roomy vehicles. Exemplary efforts along these new lanes are such endeavors as "county agents" for encouraging and demonstrating innovative educational methodologies, the vast ERIC dissemination system, educational accountability and performance contracts, systematic derivation and structuring of relevant student performance objectives, and development of major instructional packages for increased management of the total learning situation for individual students. The problem with this road is that it is still under construction; it has not as yet been surfaced; and, only the first few miles have been established. As a consequence there are signs all along the way that read "Proceed with Caution," "Work in Progress," "Detour," and "Stop! New Road Under Construction." There are sign posts along the way that tell the traveler where the road has come from, and where it ultimately hopes to go, but confidence in the likelihood that it will even reach its destination is a matter of faith.

The third road discernible at the cross roads is an access road that parallels the freeway. Its ultimate purpose is to provide the support systems needed to plot the course of the freeway, build it, maintain it, service its travelers, and develop new capabilities at road building. It leads to the tool shops, the research laboratories, and the testing centers of the road builders. It also leads to centers that prepare personnel to man the roads, or to regenerate or refreshen those who have been on the road for a long while.

Unfortunately for the traveler, this is a newly commissioned road, and thus far only its pathway has been marked.[31] The traveler is not at all sure where the road leads or what the tool shops, research laboratories, testing stations, or personnel training centers will look like. Moreover, there is no assurance that the road will ever be opened, or that the support services it is supposed to give access to will ever be established. The keepers of the roads are not at all sure that an access road, and the support systems it is designed to provide, represent good investments. After all, the concept of the freeway emerged without such "fancy extras;" and, it's even being built without their assistance. Why should precious resources be spent on that which isn't absolutely necessary, and which may not be needed at all?

When standing at the cross roads which of the three options available should the RDD&E traveler pursue? Should he take the well traveled road of research, taking particular care to avoid the potholes, approach the blind curves with caution, and take extra care to be sure that the road is leading him to the end he wishes to reach? Or, should he enter the superhighway where, even with all the "Proceed With Caution" and "Road Under Construction" signs, the other travelers are pressing their new machines at such a pace that there is danger to those who have a smaller machine, or who wish to drive more slowly? Even with the danger of being run over or shoved out of the way and with all the noise, the dust, and the confusion of the big machines moving down all four lanes, the superhighway still has some attractions. It looks like it's going in the direction a lot of RDD&E personnel wish to go, and it looks like it would let one get there relatively fast. And, once the road is surfaced, it should be relatively smooth traveling. Such attractions are hard to turn down.

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[31] The commission for the access road and some of its support systems came less than two years ago with the decision on the part of the Office of Personnel Development and Training within the National Center for Educational Research and Development, U.S. Office of Education, to establish an empirical base for their training programs. Some advance survey parties such as Clark and Hopkins (1969), Sieber and Lazarsfeld (1966), and Cronbach and Suppes (1969), had studied the advisability and feasibility of creating such a road. But, it was not until the funding of the AERA Task Force Studies, the Oregon Studies, and the Training Design Projects that well financed survey parties and planning studies were established. The results of the Training Design Studies are in and three personnel training centers have been established. The results of the survey parties are only now being completed so the future of the access road is still uncertain.

What are the attractions of the road that leads to the information and technology base that permits the improvement of the first two roads or the building of better roads in the future? It leads in a sense to the source of that which makes more hopeful the prospects of traveling either of the other two roads. All that equipment looks impressive--it should help--but too few have used it and many lack confidence to climb into the operator's seat.

So what road should the RDD&E traveler choose? Fortunately, while one man has to make one choice, the discipline of educational RDD&E can choose all three, and pursue them simultaneously. It is the writers' belief that this is the strategy which should be followed. The rationale underlying this position, some recommendations as to steps to take along each way, and some implications of the present paper for those steps are outlined in the paragraphs which follow. The paper closes with some general comments on the applicability of the present paper to personnel training and policy setting.

Following an Improved Old Road

The case has been built sufficiently well and sufficiently often for the necessity of a solid knowledge base for any of man's endeavors, so that argument need not be repeated here. What does seem to be worth saying is that the conceptual frameworks that support or underlie the development of a strong knowledge base must be kept in order. The constructs or concepts that constitute those frameworks must be well explicated and critically tested for their utility. And, advances in design and methodology must keep pace with the advances in theory so that the power of such frameworks can be fully utilized.

Fortunately, the kind of conceptual base being called for is beginning to emerge in education. The work on aptitude treatment interaction, the concept of mathemegenic research (Rothkopf 1970; Frase, 1970), the concept of learning environments (Barker, 1968; Mitchell, 1969), and the concept of a teacher as the manager of learning environments (Tyler, 1950; Schalock, Kersh, and Horyna, 1970a; Schalock, 1971) are all indicative of the kind of change envisioned if research is to provide the knowledge base that has utility to other researchers or to practitioners in the field.

Joining with the Builders on the New Road

Given the need for, the power of, and the demonstrated potential of the tools of systematic development, evaluation, and diffusion, there would seem to be no other choice but to join forces with the engineers of these activities. New ground is being broken in each of these areas, some wisdom is accumulating, methodologies are being devised and tested, and enough outputs are emerging from them that have enough value to enough people that a wide-spread base of support and enthusiasm for them is being engendered. As pointed out in the present paper, however, there is sufficient confusion and uncertainty in all three of these areas that their effectiveness at this point in time is limited. It is also probable that it will continue to be limited until our knowledge about these activities is significantly increased. A major purpose of the present paper was to provide a conceptual framework that would facilitate the extension of that knowledge base.

Building on the Work of the Advance Survey Parties

In the writers' view the critical road to be followed in the immediate future is the road that leads to the increased understanding of the domain of educational RDD&E. The case has been argued in the present paper that the activities that comprise this domain constitute the primary problem solving tools available to the field of education, and that to employ them well they must be more fully understood than they are at present. It is also argued that a necessary way to increase our understanding about such tools is to submit them to empirical investigation. The major thrust of the present paper is a conceptual framework that defines and relates the conceptual structure of the domain in such a way that it could become subject to empirical investigation. Given the availability of a framework (assuming that it is adequate to the task), the critical need is for its empirical referencing. A great deal of time should not be wasted before building upon the work of the advance survey parties that is now being reported.

Personnel Training Centers

The context within which the present investigations were commissioned was one of personnel training. Largely because of dissatisfactions with the old road and the manpower needs of the builders of the superhighway, the move to obtain empirical data on the domain of educational RDD&E was undertaken. New training programs have been established[32] and are ostensibly awaiting the data from the survey parties to help guide the substantive development of their programs. The question that must now be considered is one of the utility of the data that have been collected.

Without question, the data from the empirical studies will have some utility for the new and existing training programs for educational RDD&E manpower. While speaking now only for the Oregon Studies, data will be forthcoming on all dimensions of the conceptual sets provided in the previous section of the paper. While these data are primarily descriptive and parameter testing, rather than normative or hypothesis testing, they will do much to identify the nature of RDD&E activities as they appear within education at this point in time. As such, this should provide necessary sensitivities to the designers of training programs, even though they will not provide definitive answers to substantive questions about the field.[33] This is not an unexpected circumstance, for the decision was made early in the Oregon Studies to sacrifice data yield for methodological development.

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[32] Three experimental training programs have been established as of this writing: The Far West Laboratory Consortium which focuses on the preparation of developers and diffusers; the Learning Research and Development Center in Pittsburgh which focuses on the preparation of instructional systems designers; and the Consortium of the Ohio State University which focuses upon the preparation of field-centered evaluators.

[33] A number of training, staffing, and organizational issues were raised during the course of the Oregon Studies Project. Volume I presents these issues in light of the data which have been collected and analyzed.

From the writers' view this situation is not disappointing. The Oregon Studies alone have generated considerable amounts of new data about the nature of RDD&E activities, more than can be accommodated fully by a training program in its initial year or two of operation. Hopefully, additional studies will soon be undertaken so that, as the data generated by the present studies are internalized, the next level of data will become available. This assumes, of course, that there will be some who will travel the access road that leads to empirical research and development with respect to educational RDD&E, a hope that is contingent upon commitments of the keepers of the road.

Notes to the Keepers of the Roads

Like the personnel who staff RDD&E activities, those who determine policy about such matters and control funds that support such activities have come to the same crossroads. And, as in the case of RDD&E personnel, it is the writers' belief that they should support work on all three roads. The basis for this belief is not the simple, blind assumption that good things will come from the indiscriminate support of all kinds of activities. It rests instead on the kinds of arguments that have been outlined in the paragraphs above, and the belief that the essentially yet-untraveled road represents a significant new option for policy-makers to support.

It is also our belief that the new option will be an attractive one at the policy-setting level, for in it there is promise of sharpening the tools with which to attack the problems encountered in the nation's schools. The investment of what is now billions of dollars in RDD&E activities--through Title III of the ESEA legislation, through the Cooperative Research Act, through the decade of support for the National Center for Educational Research and Development, the Bureau of Research, and the like--must be seen as evidence concerning the faith of the Congress and others in the power of the activities about which this paper is written. But the perpetual disappointment in the payoff of such activities, in the little good that can be traced directly to them, must be having its effects upon the strength of that commitment. Because the investment in the empirical investigation of RDD&E would be relatively small compared to the overall budget for such activities within the context of education, because the time span needed for such research is relatively short, and because the potential payoff is so high, extended work upon the access road and its support systems should be undertaken. Just as the microscope and the telescope and the laser beam and the cloud chamber have opened vast new arenas of research and development in other fields, with all of their attendant consequences for the social good, the development of the methodology of RDD&E could have similar consequences.

The keepers of the roads are, after all, the ones responsible for the quality of the road system that exists. If good roads are wanted or needed, then good technology must be established for their creation. The empirical investigation of the domain of educational RDD&E would develop such technology.

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GLOSSARY OF TERMS
(ordered according to their appearance in the paper)

Terms for Conceptual Set 1: Definitions

OUTPUT. An identifiable planned outcome of targeted work activities, with targeted work activities referring to actions directed toward the realization of projected goal states.

EDUCATIONAL RDD&E. A coordinated set of problem-solving strategies designed to produce recognizable outputs that can be judged as to their quality and their contribution to the solution of educational problems.

RESEARCH. A problem-solving strategy designed to produce reliable knowledge, that is, facts, principles, theories, and laws that are generalizable and that can stand the test of empirical verification.

RESEARCH: CONSTRUCT-ASCENDENT. Research which focuses upon the identification or clarification of constructs, their parameters, or their interrelationships.

RESEARCH: TREATMENT-ASCENDENT. Research which focuses upon the identification or clarification of treatment conditions, their parameters, or their effects upon targeted outcomes.

EVALUATION. A problem-solving strategy designed to produce trustworthy information to be used in situation-specific decision making, that is, observations, reports, and other outputs of formal or informal measures that are collected with attention to the control of unwanted variance and organized so as to optimize their utility for a particular set of decision makers who have a particular decision or set of decisions to make within a particular time frame.

EVALUATION: PROCESS. Evaluative efforts which focus upon the means by which a thing is done.

EVALUATION: PRODUCT. Evaluative efforts which focus upon the consequences of that which is done.

DEVELOPMENT. A problem-solving strategy designed to produce reliable technology, that is, procedures, materials, hardware, and organizational frameworks that have a known degree of success in bringing about a particular outcome or in performing a defined operation.

DEVELOPMENT: REPRESENTATIONAL. Developmental efforts which focus upon the production of abstract or symbolic outputs, for example, theories, models, conceptual frameworks, literature reviews.

DEVELOPMENT: OPERATIONAL. Developmental efforts which focus upon the production of concrete or operational outputs, for example, instructional systems, management systems, teaching machines, computers.

DIFFUSION. A problem-solving strategy designed to bring about the utilization of generalizable knowledge, reliable technology, or trustworthy information. As used here diffusion incorporates both the concepts of dissemination and adoption.

DIFFUSION: INTERPRETATIVE. Diffusion efforts which focus upon the utilization of knowledge and/or information.

DIFFUSION: ADOPTIVE. Diffusion efforts which focus upon the utilization of technology.

Terms for Conceptual Set 2: Interactions

RDD&E AS AN INTERDEPENDENT SET OF PROBLEM-SOLVING ACTIVITIES. A situation-specific mix of research, development, diffusion, and/or evaluation activities that are coordinated over time so as to yield solution to a particular educational problem.

RDD&E AS AN INTRADEPENDENT SET OF PROBLEM-SOLVING ACTIVITIES. A situation-specific mix of research, development, diffusion, and/or evaluation activities that are coordinated over time so as to yield solutions to the particular problems encountered within a particular R,D,D, or E project.

RDD&E AS A NESTED SET OF PROBLEM-SOLVING ACTIVITIES. A view of educational RDD&E as a set of problem-solving activities that can be brought to bear collectively on either the solution of large-scale educational problems, applied individually to small-scale problems, or applied collectively in service of any particular research, development, diffusion, or evaluation problem.

Terms for Conceptual Set 3: Mechanisms

MECHANISM. An organizational vehicle that carries RDD&E activities, that is, an institution, a program, a project.

PROJECT. A formal or recognized unit of operation within which resources are brought to bear on and activities coordinated in the solution of a given problem within a given time period.

PROJECT IDENTITY. A project dimension characterized by the project's focus, setting, and linkage to the setting in which it rests.

PROJECT COMPLEXITY. A project dimension characterized by the project's resource base, its output commitments, and its related inter-program and/or inter-institutional alignments.

PROGRAM. A formal or recognized unit of operation within which resources are brought to bear on and activities coordinated in the pursuit of two or more projects that have a common focus.

PROGRAM: PROJECT-DEPENDENT. A program having its resource base tied to the specific projects that comprise it.

PROGRAM: INSTITUTIONALIZED. A program having its resource base tied to a programmatic or goal-oriented effort, rather than to the specific projects which constitute it.

RDD&E DEDICATED INSTITUTION. A formally constituted and recognized unit of operation within which two or more programs of R,D,D, and/or E rest, and which assumes its primary identity from those programs.

Terms for Conceptual Set 4: Outputs

OUTPUT. An identifiable,planned outcome of targeted work activities, with targeted work activities referring to actions directed toward the realization of projected goal states.

PRODUCT. A tangible or "hard" outcome of work effort that survives in a form that makes it transportable, for example, an instructional system, a conceptual framework, a final report of a research or evaluation project.

EVENT. An outcome of work effort that results in the occurrence of an observable transaction, for example, a conference, a speech or seminar, consulting or counseling activities.

CONDITION. An outcome of work effort that results in the creation of a desired circumstance, for example, a change of attitude on the part of students or their parents, mastery of information, an opportunity for teachers to participate in policy decisions.

OUTPUT INDEX. The listing of outputs that emerge from a particular project.

OUTPUT: FOCAL. An outcome of work effort expected by contractual obligation to emerge from a project.

OUTPUT: TERMINAL. An outcome of work effort that constitutes an essential part of or prerequisite to a focal output.

OUTPUT: COMPONENT. An outcome of work effort that constitutes an element of or one step in the achievement of a terminal output.

OUTPUT: FACILITATING. An outcome of work effort that is supportive to the generation of focal, terminal, or component outputs, but is not in itself an instance of such outputs.

OUTPUT MAP. A graphic portrayal of the hierarchical and functional dependencies of outputs within a given project.

OUTPUT STANDARDS. The criteria of excellence expected of or applied to a particular output.

Terms for Conceptual Set 5: Operations

FUNCTION: The largest meaningful classification of operations involved in the production of outputs.

FUNCTION: POLICY SETTING. The establishment of standards for the focal output(s) of a project, the allocation of resources toward the realization of that output, and the establishment of guidelines as to the desired procedures to be followed in and anticipated consequences to derive from the project as a whole.

FUNCTION: MANAGEMENT. The orchestration of the energy, time, materials, facilities, and information available to a project so as to optimize desired outcomes and minimize undesired outcomes.

FUNCTION: PRODUCTION. The execution of the operations required to achieve a planned outcome of a project, given the constraints and enablers provided by policy and management.

ACTIVITY: The largest meaningful unit of work engaged in to carry out a particular function.

TASK: The largest meaningful unit of work engaged in to carry out an activity.

ACTION. The largest meaningful unit of work engaged in to carry out a task.

Terms for Conceptual Set 6: Inputs

ENABLER: Knowledge, skills, and sensitivities prerequisite to the performance of the operations required to produce a particular output.

Terms for Conceptual Set 7: Organization

PROJECT ORGANIZATION: The manner in which such factors as structures, functions, roles, responsibilities, jobs, etc. are defined and positioned within a project in order to perform the work required to produce targeted outputs.

A CRITIQUE OF THE PAPER

Glen Heathers
Learning Research and Development Center
University of Pittsburgh

An important task in the study and improvement of educational R&D is the development of a conceptual scheme for ordering data in this diffuse and relatively unformed field of activity. Schalock and Sell are to be applauded for undertaking this formidable task and the framework they present, admittedly tentative and incomplete, is a valuable contribution. The authors note that the framework already has gone through several revisions in the course of analysis of 20 representative R&D projects. Further revisions and extensions clearly are in order and doubtlessly will result from future work by its authors, and by others. Perhaps the chief function of this critique is to identify limitations of the present framework, then to suggest ways in which it can be strengthened.

A difficulty in writing this critique is that the other Volumes in the series of reports on the Teaching Research project are not in hand. Those volumes present the case-study methodology and the body of case data derived from study of the 20 selected projects. As such, they constitute the first test of the usefulness of the conceptual framework. The remarks that follow should be viewed with this limitation in mind.

The Schalock-Sell paper, following its introduction, documents the existing terminological muddle in educational RDD&E. That section does not attempt to resolve the muddle; its chief contribution is a valuable bibliography that readers can use in exploring problems of definition as represented in the literature.

Central to their conceptual framework are the authors' definitions of R, D, D, and E. While each definition begins with the phrase, "a problem solving strategy. . .," it is the intended outputs that anchor the definition. In this reviewer's judgment, this is a major limitation of the paper as a whole. Surely adequate analysis of R&D projects requires specifying the features or steps in the problem solving process that constitute the entering phase in each definition. Case studies then could document how this process was carried out. Inasmuch as Schalock and Sell do not deal with this part of each definition, they leave a major analytic task still to be performed. Numerous articles in the literature offer analyses of problem solving task flows in educational R&D. An example is Hemphill's article on Educational Development (Urban Review, 1969, 4, 23-27). It would have been useful had Schalock and Sell expanded their definitions at least by referring to such articles.

The authors make a good case for the interactions among R, D, D, and E. The first D in the acronym, i.e., development, is a good case in point. Narrowly defined, educational development usually refers to building programs, procedures, or products involved in instruction.

More broadly defined, development applies also to building anything new in education, whether research methodologies and study designs, evaluation procedures and instruments, or diffusion methods and programs. While the paper recognizes this confusion, a more specific treatment of it would have been helpful.

The term diffusion, as the authors point out, has been used to mean various things. Their definition, it should be noted, covers the utilization of knowledge or technology. The present writer leans toward the Guba and Clark distinction between diffusion as covering dissemination and demonstration, and adoption as covering trial, installation, and institutionalization. A difficulty seen in their formulation, as well, is that both diffusion and adoption are product-oriented rather than consumer-oriented. There appears to be need for another term in the RDD&E acronym that provides for the design and conduct of local educational change programs that begin with identified needs of school systems, proceed to the analysis and evaluation of existing resources available nationally to meet those needs, then adapt and implement selected changes suited to the local situation. Perhaps the term utilization is as good a name for this process as can be found. What it is meant to stress, in contrast to the term diffusion, is a need focus rather than a product focus.

Schalock and Sell offer a valuable illustration of the interaction of R, D, D, and E in the instance of a school system setting out to strengthen its reading program. The focus of their illustration is utilization as just outlined. Certainly it would be desirable for school systems to be able to carry out the specific research and development activities involved in building a good reading program. Presently, few school systems have the resources in time, money, and R&D competency to do this. The illustration, then, poses the critical question: to what extent can school systems be expected to perform major research and development activities?

Certainly school systems, to mount significant change programs, must be concerned with designing, conducting, evaluating, and diffusing those programs. To accomplish these things, usually they require considerable expert help from outside sources. Fundamental work in the research and development processes required to build new educational products such as reading curricula usually is well beyond present resources existing in any but the largest school systems. An adequate conceptual framework for educational RDD&E would need to provide for analyzing the conditions under which an institution, whether a school system or another educational agency, can successfully undertake given R&D activities, particularly in projects requiring major innovations falling within the domains of research and development. It is to be noted in this connection that the Schalock-Sell scheme is only sketchily built in two areas that bear directly on this matter: Conceptual Set 6. Inputs, and Conceptual Set 7. Organization.

Conceptual Sets 3, 4, and 5 dealing with mechanisms, outputs, and operations appear to this reviewer to employ sets of terms that are, in the main, good at a general descriptive level. The distinctions between projects, programs, and institutions appear useful. Likewise the criteria for project identity and project complexity seem justified as a first crude cut. It is more difficult to see from inspection the resolving power of the distinctions among product, event, and circumstance; or of those among focal, terminal, component, and facilitating outputs. Setting up a hierarchy of functions, activities, tasks, and actions as classes of operations seems quite reasonable. With all of these categorizations, the first test is how useful they are in case-study description and analysis. The critical test, to come later, is the value of the distinctions when work proceeds to the analysis of factors distinguishing more productive from less productive R&D activities.

The output indexes (Tables 6-9) and the output maps (Figures 4 and 5) do not bear identifiable relations with the category scheme indicated above except that Table 7 distinguishes products and events, while Tables 8 and 9 distinguish policy setting, management, and production functions. The question that must be raised is how the analysis proceeds from the form of the output (usually a report) to its substance. How is the category system employed in the case analyses to yield such distinctions?

An important limitation of the conceptual framework as presented concerns output standards. This limitation is fully recognized in the paper, with reasons given. From the information given about project interviews, it is evident that a major thrust of work on the analysis of educational RDD&E projects is needed in this critical area. Schalock and Sell can probably make an important contribution to clarifying the bases for such work by providing a detailed report on their efforts to obtain data on output standards.

In their concluding section on "The Parable of the Roads," Schalock and Sell come to grips with the central purposes of the Oregon Studies--to provide conceptual and data bases for strengthening educational RDD&E through research on R&D and through the training of R&D personnel. Accepting their parable, they make a good case for their three roads, and for sustained research-and-development programs to improve all three. Their paper is a significant step in that direction. Viewed in relation to the other reports of the Oregon Studies, it can be offered as an important road-mapping job.

RESPONSE TO THE CRITIQUE

H. Del Schalock and G. Roger Sell

Heathers' critique is cript, sensitive, and pointed. In fewer pages than given to the Introduction to the paper he manages to comment not only on all facets of the paper, but to point up its essential strengths and weaknesses as well. Because of the brevity of his critique, however, some of the points he makes are open to misunderstanding or misinterpretation. This applies to his criticisms more than to his plaudits, so our response will be simply to reiterate his criticisms as we understand them, and then to comment briefly.

As we read Heathers' criticisms we find three kinds: (a) omissions in the framework; (b) weaknesses in framework content; and (c) weaknesses in content treatment. We will respond accordingly.

Omissions

Heathers sees two major omissions in the framework: (a) failure to take account, in our output-linked definitions of RDD&E, of ". . . the features or steps in the problem solving process that constitute the entering phase in each definition" (p. 262); and (b) failure to ". . . provide for analyzing the conditions under which an institution, whether a school system or another educational agency, can successfully undertake given R&D activities, particularly in projects requiring major innovations falling within the domains of research and development" (p. 263).

Our response to the first charge of omission is "Maybe we're guilty and maybe not. It depends on what Heathers means." If he means that the framework makes no provision for the description or analysis of how staff within a project produce the outputs for which the project is responsible, which is the solution of problems in production, management, and policy setting, he is in error. The conceptual set dealing with operations (Conceptual Set 5) is designed precisely for that purpose.

If he means that the framework makes no provision for the description or analysis of all that goes into a project before it starts, that is, in the selection of the problem to be studied, in the selection of the broad strategies to be employed in its solution, etc., he is correct. The framework covers only ongoing project/program operations. Since it is likely that Heathers is making the latter point, his point is well taken, for in problem selection and in broad strategy for problem solution, long term gains in educational improvement are likely to be made.[1]

To the second charge of omission our response is "It is an intended omission, because the ability to determine whether an institution or agency has the capability to carry out a specific R, D, D, or E activity seems to us to be an analysis of a totally different kind." This is not to say that such capability is unimportant. It is, especially if RDD&E are to become integral, ongoing parts of the educational enterprise. But recognizing this importance is a different matter from saying that it should be included as a part of a framework designed to describe ongoing RDD&E activities.

Weaknesses

Heathers points to three weaknesses in the framework: (a) the conceptualization of diffusion (p. 263); (b) the treatment of inputs to and the organization of projects and programs (p. 263); and (c) the classification scheme for outputs (p. 264).

Our response to the first charge is one of confusion, in regard both to what Heathers says and what we think he means. He confuses us in what he says by shifting between the position we have taken and the position that Guba and Clark have taken in relation to diffusion. This is especially so in the sentence "A difficulty seen in their formulation, as well, is that both diffusion and adoption are product oriented." Is this in reference to our position (if so it is not correct) or is it in reference to the position of Guba and Clark?

More important is our confusion over what we think Heathers means. We think he thinks that we think differently than he thinks (that should add clarity to the discussion!). Heathers implies that our view is counter to the distinction between dissemination and adoption proposed by Guba and Clark. This is not so. We include both under the term diffusion, but restrict their usage to the diffusion of different kinds of R, D, & E outputs (see pp. 217, 222 for first order definitions, and Table 5, p. 222 for suggested second and third order definitions). The rationale for the position we have taken appears on p. 209. Given the uncertainties surrounding Heathers' comments it is hard to respond to his proposal to coin the term "utilization" to cover the ". . . design and conduct of local educational change programs."

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[1] While the conceptual framework was developed so as to provide descriptions of ongoing RDD&E projects/programs, the methodology that carries the application of the framework can be applied as readily to the planning stage of a project as it can to its operational stage. Given the nature of the methodology (see Vol. V in the series reporting the Oregon Studies on RDD&E) all that is needed is to specify the expected outputs from the planning effort, for example, the identification of a problem or the completion of a proposal, and then apply the systematic inquiry strategies that are incorporated within the methodology to elicit the "problem solving" steps followed in arriving at the definition of the problem or the development of the program.

In response to Heathers' comment about the short treatment given project inputs and organization in the framework we simply acknowledge it. The purpose of including Conceptual Sets 6 and 7 at this point in time was simply to "draw attention" to the input and organizational dimensions of project and program operation for ". . . little has been done thus far in the development of the framework . . ." in those areas (see p. 244).

Our response to Heathers' view that "It is more difficult to see from inspection the resolving power of the distinctions among product, event, and circumstance; or of those among focal, terminal, component, and facilitating outputs" (p. 264) must be a bit more complex. The labels given these category sets may not appear to be particularly powerful, or the categories may seem to be at too fine a detail to be functional, or they may not "square" with how outputs are typically thought of. But they do in fact represent category sets that evolved against the realities of the field and were found to be functional in handling those realities. Space does not permit a detailed discussion of their origins or use, but for a sense of the distinctions being made between kinds of outputs (products, events, conditions) the reader should review the definitions that appear in the GLOSSARY that accompanies the paper. The rationale underlying the four level category set used to describe the positioning or patterning of the outputs found within any project can be found on p. 233 of the paper. As Heathers rightly points out, however, even though the category sets have proved useful in the description of ongoing projects, their critical test will come when the data from the study have been analyzed and when ". . . work proceeds to the analysis of factors distinguishing more productive from less productive R&D activities."

Weak Treatments

In Heathers' judgment there are also three areas in the paper that received relatively weak treatment, even though the dimensions of the framework being described at those junctures apparently are adequate: (a) the discussion of the implications of our definition of development (p. 262); (b) the treatment of standards held for outputs (p. 264), and (c) the illustrations provided of output indexes and maps (p. 264). In our opinion his judgment is accurate on the first two counts, but only partly so on the last.

In the first case, development was dealt with only at the level of definition (see pp. 216 and 222 of the paper). In the second case, due to difficulties encountered in obtaining sufficient data base for category development-refinement, category sets simply had not been developed at the time of writing (see pp. 237 and 238 of the paper).

In the third case, however, Heathers is both accurate and inaccurate in his comments. He is accurate when he points to the lack of identifiable correspondence between the categories used to refer to the patterning of outputs in the body of the paper (focal, terminal, component, facilitating) and their appearance in the output maps (Tables 4 and 5) used to illustrate the patterning effect. This was intended to be shown in the tables by block coding; however, it did not appear in the draft copy reviewed by Heathers, and we have used editorial license to correct this omission in the final version printed here.

So much for the heart of Heathers' critique. Comment upon a relatively peripheral observation will close our response to it. Heathers observed (p. 262) that the chief contribution of the review of literature offered within the paper is its value as a bibliography. With unabashed acclaim, we view it a bit differently. It is not in any way an exhaustive review, and thus is not a particularly good bibliography. What it aimed to do and what we think it does is to highlight the definitional issues that currently exist in the field--a task which many such reviews somehow fail to do.

SUMMARY CRITIQUE

CRITIQUER: Francis S. Chase
Educational Consultant,
Professor (and Dean) Emeritus
The University of Chicago

POSTSCRIPT TO THE R,D,D,&E PAPERS

Francis S. Chase
Educational Consultant,
Professor (and Dean) Emeritus
University of Chicago

It seems unlikely that any except the most conscientious and persistent readers will have waded through the four long papers, the several critiques, and the responses to the critiques to reach this point. Those who have done so should be spared this postscript. The selective samplers, who have come through with a hop, some skips, and an occasional jump, probably have gathered what is most worth gleaning. One paper only requires concentrated attention to garner what it offers; and from another, fruitful generalizations present themselves readily; beyond these the harvest is not abundant. This memorandum may serve to reassure the skimmers--and occasionally lead them back for a second glance; but it is addressed chiefly to those eccentrics who leap to the end for clues useful in backtracking.

In spite of the long association of the writers through several conferences and opportunities for revision and rerevision (by authors of at least three of the papers) following reactions from presentations to two selected audiences, the papers do not fit together in any systematic way; and only two of them--those by Gideonse and the team of Schalock and Sell--appear to have been improved significantly since the early drafts.

The wary reader will do well to start with Gideonse's sprightly philosophical and commonsensical commentary and proceed from there through the tightly organized and painstakingly constructed framework by Schalock and Sell. Where the wary reader goes from here may be left to his own discretion; but it may prove illuminating to sample the critiques before the other two papers. There is a good chance that a number of readers will find the reviewers' comments at least as rewarding as the papers which evoked the critiques. (This assumption is based on faith in the powers of the critiquers as the critiques have not been seen by this commentator.)

It is unlikely that anything can be said in this postscript that has not already been said at least as pointedly in one or more of the papers and critiques; but, in deference to the assignment, an attempt must be made to assess the contributions of the papers, severally and collectively. Three related questions may be posed as points of entry:

1. Do the papers, individually and collectively, add anything of importance to an understanding of what and how research and development concepts and operations may contribute to the improvement of education?

2. Will the reader who attends conscientiously to the content of the four papers come away with a clearer preception of the essential nature of research, development, diffusion,

and evaluation in education and of how they relate to each other and to the planning and management of educational operations?

3. Do the several treatments complement or reinforce each other so that taken together they afford a consistent and coherent view of the four processes as elements essential to any systematic attempt to increase educational effectiveness?

Brief answers to these questions, in reverse order, may be stated as follows:

Interpaper coherence appears slight or nonexistent; positions in one paper are reinforced seldom by another paper; and such complementarity as exists seems to spring more from chance than from design.

Discerning readers, perhaps, will get a clearer fix than they previously had on the four processes, and their interrelationships, from the definitions, differentiations, and similarities as expounded by Glass and Worthen in their rather pedantic, but occasionally clarifying, attempts to set these processes in a general framework of educational inquiry; and, from close attention to Schalock and Sell, they may acquire sets of concepts useful for examining the processes from varying perspectives and begin to perceive the makings of a framework for empirical investigation of educational research and development. Gideonse, arguing not from definition of terms but from a consumer-oriented viewpoint, offers provocative ideas for educational R&D policy-making and planning; and Briggs tries, without notable success, to point out practical ways of implementing development and diffusion in education.

Contributions to an understanding of what research and development (interpreted broadly to include the four processes) can contribute to educational improvement, and how the potential contributions can best be realized, are skimpier than might have been expected from the pooled efforts over a period of months by authors so well qualified by ability and experience. Some inferences may be drawn from Briggs' inadequately developed concept of consortium-based diffusion and development, and a greater number from Gideonse's incisive comments on policy for educational R&D.

The foregoing statements admittedly are no more than abbreviated personal judgments which are set forth without evidence, but which the reader may readily confirm, negate, or modify on the basis of his own reactions to the papers. It may be informative to move from these summary answers to questions arbitrarily posed by this commentator to an attempt at a rough analysis and assessment of what the papers actually contain. The major content of the papers may be classified either under the heading of definitions and conceptual frameworks or under propositions bearing on R&D policy, planning, management, or personnel training.

Of the more than 250 pages of typescript in the four papers, over 40% is devoted to attempts to define and place in educational contexts the four processes of research, development, diffusion, and evaluation. This treatment is limited largely to two papers: that by Glass and

Worthen which examines research, development, diffusion, and evaluation within the general field of educational inquiry in order to illuminate the relationships of these processes to each other and to other inquiry-related activities; and that of Schalock and Sell, which presents the four processes as "a carefully defined set of concepts and an equally carefully defined network of relationships between concepts." The other two papers address themselves to definitions only as necessary to the attainment of other purposes.

The quality of these treatments, judged in their own terms, is relatively high in comparison with previous attempts to define the meanings and applications of the four terms in the field of education. Glass and Worthen do a scholarly, if somewhat tedious, job of moving from definitions centered on the purposes and activities involved to a series of attempts to relate the processes to each other and to the general domain of inquiry in education. Along the way they take time out to reaffirm or question views expressed by other writers with regard to the appropriate methodology for one or more of the activities or with regard to the application of the outcomes. It is a game beloved by academicians, played for the edification of other academicians and for the kudos bestowed by the academic community. One may question some of their conclusions, detect small errors here and there, or insist on his own allegedly superior version; but one probably will concede that the game is played according to the rules favored in communities of educational researchers, with results that compare favorably with most such exercises.

Schalock and Sell adopt a different approach and produce significantly different results. They set their discussion against the background of the actual and potential contributions of research, development, diffusion, and evaluation to the improvement of education and move through a review of the literature to the major thrust of the paper, which is to provide a framework for viewing educational RDD&E. Definitions of the four terms are constructed with care, and with an eye to their subsequent use. The first level definitions are clear and succinct, and provide useful characterizations of the four terms. The second level definitions and illustrative third order definitions carry the analysis further, and into more debatable ground.

They treat definitions as the first of seven conceptual sets related to the outputs that the four processes are intended to produce. Their second conceptual set is denoted "interactions" and offers provocative concepts of RDD&E as interdependent, intradependent, and nested sets of problem-solving activities. Figure 1 provides an illuminating schematic illustration of a network of these problem solving activities in support of a research project. From this point on, the authors stretch out their set of categories until they become a little thin; but, nevertheless, come up with some interesting observations. The treatment of the mechanisms or vehicles that carry RDD&E in education is clarifying, but the figures seem poorly adapted to picturing the dynamic interactions involved. The discussion with regard to classes of outputs is intriguing and may have some practical applications. The other categories likewise provide interesting and potentially useful ways of analyzing or examining research and development operations.

The utility of these essays into definition is not entirely clear. I can see some usefulness to students who are encountering for the first time the concepts of these processes in educational research and development. The approach of Schalock and Sell may also produce some assistance in analysis and evaluation of actual operations. In summary, it may be said that: The definitional essays are more than ample in quantity, almost to the point of superfluity; the quality is comparatively high in comparison with other attempts to get at the meanings and applications of the four terms; and the utility is somewhat dubious with respect to the Glass-Worthen paper and potentially high for the application of the Schalock-Sell framework to empirical studies and assessments of educational research and development operations.

The preceding commentary has centered largely on definitions of the four processes to which the major part of two papers is devoted and to the resultant contributions to the understanding of, and communication about, research and development in education.

The discussion of strategies for control and implementation of research and development processes in education are found mainly in the papers by Gideonse and Briggs. The former adopts a more or less philosophical approach from which he spins off a whole series of generalizations. The effect may be illustrated by stringing together some key generalizations which are scattered throughout the paper, thus:

> ... Science as it is practiced in managing the support of education is as much a social and political activity as ... a scientific one ..., [therefore] ... the conditions causing practitioners and policy-makers to attend to the ideas emerging from science must be established parallel to and as part of the support of science itself ... [It follows that] educational research and development must be conceived in terms of the consumers and clients it is supposed to serve. ...[which means that] ... examination of the conditions, reasons, and requirements for change within the educational system itself is the first necessary step to the improvement process ... [and in decision-making] ... status hierarchies ... are replaced by transactional processes of confrontation, bargaining, or negotiation among equals.

These views are not as novel as Gideonse seems to think, but they are stated with unusual force and aptness, and so related that implications become apparent. Briggs and Gideonse reinforce each other at several points, although Gideonse's paper is more philosophical-political, and Briggs' is beamed more to the practical, even though it does not constitute an adequate guide to action. Briggs and Gideonse agree on such points as that R&D planning operations should represent a transaction among equals, and that the delivery system is essential to effective development. The formulations of both Gideonse and Briggs can be accommodated within the Schalock-Sell framework.

In the first section of his paper, Briggs develops the hypothesis that specific changes in education depend largely upon who wants the change, the general methods used for producing the change, and what resources for change are employed. He uses six categories of change initiators from which, for some curious reason, he omits local and state education authorities, and professional organizations. With the aid of a table, he sets forth the methods, resources, and mechanisms which are operative or applicable to each category of initiators of change. While the discussion is thought-provoking, it ignores some important approaches to change which have had influence in the past, such as the pioneering and laboratory schools, the contributions made by organizations such as cooperative school councils (a kind of consortium), and the impact of movements and events such as the Child Development Movement in the early part of the century, the Great Depression of the 1930's, the Progressive Education Movement, and the Civil Rights Movement.

When we examine the contributions to the application or implementation of the four processes in education, we find some interesting contrasts. Glass and Worthen offer proposals for implementation which bear no discernible relationship to the main body of their paper. Their proposals boil down to four points:

1. Increase expenditures for basic educational research and the training of researchers in the universities, and involve all of the social sciences.
2. Move schooling "out of the grants economy and under the influence of the market mechanism" (which the authors claim will have such an effect on educational practice as to make insignificant all other approaches).
3. Development and diffusion of marketable products should be conducted primarily in the private sector; but universities and regional laboratories possess much talent for developing curriculum materials.
4. Educational evaluation does not fit into the reward structure within educational research and, therefore, may require the establishment of new types of organizations--presumably nonprofit.

In short, the solution offered by Glass and Worthen for educational renewal is simply: to move schooling along with applied educational research, development, and diffusion into the private sector; to support generously basic educational research and some curriculum development, chiefly in the universities; and to hope that specialized organizations will arise to provide evaluation. Having thus declared themselves, they acknowledge some problems in applying the market mechanism to education (due, in large part, apparently, to corruption introduced by "the educators' desire to eliminate competition"); but they brush these problems lightly aside in their contemplation of the beauty of education constantly transformed by the benign operations of free enterprise enlightened by university contributions to basic knowledge. Their conclusions are not well supported either by evidence or argument and appear too often as dogmatic assertions. This is notably true of the statement alluded to in item 2 above (of which more later).

The contributions of Schalock and Sell to implementation consist largely of the argument that educational improvement requires continued support for educational research, careful attention to the building of capabilities for systematic research and development, and development of the necessary support systems for that purpose. One of the support services suggested is that of a personnel training center.

Gideonse suggests three implications of what he calls the "market mechanism", namely: (a) the cultivation of research techniques associated with the identification and definition of operational need; (b) a deliberate attempt to stimulate the creation of autonomous institutions, scattered across the country; and (c) continual searching out of alternative ways of cultivating research capabilities. He also offers suggestions for decision structure, based on the idea that research and development in education is a social and political process as well as a scientific one. Among the more plausible ideas are the holding of public hearings across the country on a regular basis to enable citizens to present their ideas about what is needed, the use of "administrative lobbyists" as a way of assuring continuous contact with important interest groups in education, and much closer and more continual Congressional oversight of educational research and development. Gideonse concludes his well-organized, consistent, and persuasively presented view of educational research and development with a vision of some other means toward the goal of building an educational system based on current knowledge, with an operating philosophy shifted from systems maintenance to systems renewal and increasingly accountable to multiple clients, both individual and societal. He then offers some provocative comments on governance, assessment, and accountability, the development of research capabilities, the creation of adaptive organizations, linkage mechanisms, and manpower development. He summarizes his own contributions succinctly by saying "the analysis addresses the importance of identifying and defining client needs first, the availability of delivery systems to serve those needs second, and only then what innovations or knowledge might be required to create something that could be delivered to fill client needs."

Briggs' suggestions for implementation of development and diffusion are offered chiefly in connection with his proposed "consortium-based model for development and diffusion." He sets forth a number of basic assumptions upon which the proposed model rests, including an increasing press for major changes in education that will lead to the forming of consortia to bring about the agreed upon changes, heavy involvement of the lay public in decision making, and the choice of goals which will require massive new development and evaluation efforts and new working relationships between education and industry. He then moves to what he calls "steps of the model" which go into such details as translating goals into objectives, identifying assumed entering competencies, preparing posttests, selecting the media, and so on through 17 items, ending with the training of teachers and the permanent reassessing of needs. He concludes with what he calls "some elements for success of the model," but for some obscure reason does not address himself forthrightly to the enormous problems encountered in putting together an effective consortium composed of several kinds of organizations.

The big problems in the building of effective consortia of the scope implied inhere in the long processes of planning and negotiations required (a) to bring about broad agreement on the needs to be met, the direction of change, and the goals of action; (b) to assess the capabilities and primary functions of the several agencies as a basis for differentiation of functions, and the playing of complementary roles for the accomplishment of the agreed upon purposes; (c) to assure equitable contributions by the several agencies to a pool of substantial resources, with each agency's contribution being determined by consideration both of its resources and of the returns which it may anticipate on its investment in the common effort; (d) to obtain agreement on the establishment of a decision-making body, or bodies, which will give all members equal opportunity to participate in policy making--and at the same time facilitate decisions based on analyzed information and shared values; (e) to work out means through which each participating agency will be assured of benefits in terms of improved performance of its own functions, approval by its own constituency and sources of support, and improved morale of its staff. These are conditions not to be achieved easily or without long and painful negotiations and the exercise of resourceful and imaginative leadership. Moreover, these conditions are difficult to attain at all under funding policies which reward competition among agencies and foster rivalry in respect to credit for accomplishments.

It is doubtful that any critiquer will offer judgments as devastating as those incorporated in the papers by Gideonse and the team of Glass and Worthen. Gideonse, early in his treatise, expresses doubt that educational R&D is likely to be advanced by "worry and concern" about the state of the art or "the nature and interrelationships of R&D functions and processes." Taken literally that view renders futile a large part of the labors by Glass and Worthen, Schalock and Sell. In a footnote, Gideonse attributes the excessive concern (peculiar to education) with R&D functions to the "long prevalent methodological consciousness of educational research and the basic insecurity about our pretensions to scientific status." One cannot help wondering whether the current fashion of "modeling," to which Gideonse and Briggs succumb, does not spring from the same source. It is difficult to see what is added to Gideonse's strong presentation by mislabeling it a "market model."

Glass and Worthen in their most emphasized generalization declaim as follows:

> The net effect on educational practice of all the scholarly papers and conferences on educational change which could be produced, all of the laws Congress could pass, and all of the federal programs which could be mounted would be insignificant beside the impetus for change that would result from moving schooling out of the grants economy and under the influence of the market mechanism.

This judgment taken at face value disposes of the whole set of papers and critiques and of all government-supported research and development as well. The generalization, however, is put forward more as an article of faith than as a hypothesis for inquiry, evidential analysis, or argument. The argument, such as it is, reaches the lowest level in the statement that: "The knee-jerk bureaucratic response of passing a law or mounting a government program whenever a problem is encountered is wasteful and a potential failure as a means of promoting educational change." The authors follow this with another assertion that in their opinion "moving schooling out of the grants economy into a market economy would cause educational development and diffusion to flourish." They build their case for moving schooling into a "market economy" and for obtaining educational research and development through private industry through overlapping, though not identical arguments. The major points seem to be as follows: (a) bureaucracies (in which educational institutions may be included) are notoriously ineffective in producing or nurturing change; (b) most applied research and development in other fields is done by private industry; (c) the hard times facing the grant economy argue for reducing the strain on public support for education through the transfer of responsibility for applied research and development to industry; (d) there are a number of trends toward putting education in the private sector.

Glass and Worthen appear to overlook the fact that it took a long struggle, growing out of the inadequacies of private schooling, to create the public school systems in the United States and elsewhere. To be sure, the "voucher" system was not then in vogue, but there were charity schools. They similarly overlook or lightly brush aside the unimpressive educational research and development record made by industry when it has moved from the "hardware" into the "software" of educational development.

It is legitimate to ask how the papers might have been strengthened. The first suggestion that occurs to the weary reader is simply "by shortening." This might have been accomplished by condensing and consolidating the review of the literature into a single paper and combining or reducing the number of definitions and the number of conceptual categories.

On the other hand, some further elaboration would have been useful for such salient proposals as determining the educational needs of consumers, perfecting delivery systems, and establishing consortia for development and diffusion. Further attention might also have been given to the establishment of networks of communication and mutual stimulation among researchers, developers, evaluators, diffusers, and practitioners (or intermediate consumers). A section on the mix of capabilities required for effective applied research and development in education would have been a helpful springboard to implications for training of personnel for educational R&D.

A GUIDE TO THE OREGON STUDIES IN EDUCATIONAL RDD&E

Volume I

SUMMARY REPORT

An introduction to and overview of the Oregon Studies as a whole. The volume contains an outline of the history of the Studies, the rationale around which they were designed, the context within which they were carried out, and the procedures followed in their execution. It also contains a description of the projects selected for study, the rationale underlying their selection, the criteria and procedures used in their selection, and an overview of the data collected on each project. Finally, the volume contains an introduction to the "case profiles" that house the data collected on each project, the results of all cross-project analyses, and the summary recommendations that have been made relative to training and the continued study of educational RDD&E activities. A brief description of the case study methodology developed within the Studies, an overview of a process whereby investigators may query computer-stored data files and original interview statements to obtain information bearing upon specific questions relating to training, manpower, policy, and work performance, and supporting data accompany the volume.

Volume II

THE LITERATURE OF EDUCATIONAL RDD&E

A compendium of existing literature that defines, describes, differentiates, or relates the activities labeled educational research, development, diffusion, evaluation, and various combinations thereof. The articles within the volume are introduced as a collection. Linking passages provide an interpretive context both for individual articles and for the sets into which they have been grouped.

Volume III

CONCEPTUAL FRAMEWORKS FOR VIEWING EDUCATIONAL RDD&E

A collection of papers which provide the conceptual underpinnings to the Oregon Studies. It contains three papers commissioned by the Studies as a basis for conceptual development, and a paper by staff from Teaching Research that describes the conceptual frame that guided and grew with the empirical thrust of the Studies. Each of the papers is a major document which defines, differentiates, and relates one or more facets of educational RDD&E and provides a supporting rationale for the position adopted. Each paper is accompanied by a formal critique, and the set of papers is accompanied by an introductory and summary critique.

Volume IV

PROFILES OF EXEMPLARY PROJECTS IN EDUCATIONAL RDD&E

A collection of twenty case profiles that form the data base in the Oregon Studies. Printed in three parts, the profiles describe five research projects, seven development projects, three evaluation projects, and five diffusion projects. Each profile contains descriptions of the structure and function of the project being analyzed, the specific outputs expected to emerge from it, the operations required to produce each output, and the knowledges, skills, and sensitivities judged to be essential to the performance of those operations. In addition, each profile contains sections dealing with the "dynamics" of project operations and implications that derive from the project for preservice staff training. The projects described range from small, two-man efforts within university settings to very large school district "projects" employing several dozen staff members. Eighteen of the twenty projects described were judged to be illustrative of the kinds of RDD&E activities likely to occur within the context of education in the future. The twenty projects account for analyses around 298 project outputs and interviews with 134 professional staff members.

Volume V

A METHODOLOGY FOR THE STUDY OF EDUCATIONAL RDD&E

A detailed description of the most refined form of the data collection methodology developed within the Studies, directions to guide its use, and the decision rules needed for the volume to function as a users manual. The volume includes information on procedures used in site contact, site preparation, data reduction and analysis, and profile preparation. It also includes information on the category sets used in data reduction and the computerized data files that contain or provide access to all data collected in the Studies.

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